

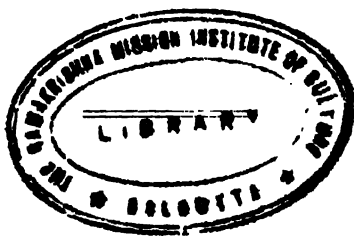
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*Containing the Papers read before the Society during the
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PAPERS READ BEFORE THE SOCIETY.

1926-1927.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on November 1st, 1926, at 8 p.m.*

I. OBJECTS UNDER REFERENCE.

THE PRESIDENTIAL ADDRESS.

By C. LLOYD MORGAN.

IN his Lowell Lectures on *Science and the Modern World*, Professor Whitehead invites us to use the word "organism" in an extended sense. In that sense a crystal, a molecule, an atom, to go no lower than this, are organisms no less than an amœba, a rabbit, a man, to go no higher. In any such organism certain events or clusters of events go together in certain kinds of relatedness in such wise as to constitute that organism, atomic, molecular, living, and so forth, in accordance with its status in a natural hierarchy.

I respond to his invitation to use the word "organism" in this extended sense. Sympathetically I welcome an "organic theory of nature" such as his, with its stress on so-called internal relations.

Subject to an organic theory of nature, I propose to consider "objects under reference." But what I mean by an "object"

may not imply all that Mr. Whitehead means when he uses this word; and what I mean by "reference" may or may not be in accord with what he means by "prehension." It will, therefore, be well to begin by stating what I mean by "objects under reference."

When I see the planet Jupiter in a star-strewn field of vision I speak of an object under reference—in this case under visual reference. But in some measure I *interpret*, however naïvely, what seems to happen. I believe that there is a cluster of events "out there" which in some way "influences" the retina of my eye. I believe that on receipt of this influence there is reference on my part to that which I call the planet Jupiter as an object under such reference. Thus two "organisms" seem to be related in two quite different ways. I use the word "object" for the outcome of one of these kinds of relatedness. For that which is related in the other way and is correlated with the object of reference I provisionally use the word "thing."

In the case I have taken—when I actually see Jupiter—the reference to the object under vision is "immediate." But I do not actually see Jupiter now. I only picture the planet as I saw it last night, or as I expect to see it to-night. There is here and now "mediate" reference to that which we speak of as a visual image of Jupiter in its star-setting. I ask leave to include also this and the like in the class of "objects under reference."

For the purpose in hand, then, I restrict the use of the word "object" to that which has being under immediate or mediate reference on someone's part, and to that which is correlated with a thing at some time existent. But I do not restrict the use of the word "reference" to reference to that which has being as an object in this sense. There may be reference on someone's part to that which is signified by π , or G.P., or by the words "intemperance" or "jealousy." In such cases there is *reflective* reference to that which, by conversion of adjective to noun, one

might call a "reflect." This is not, though it may imply, objective reference in the sense here intended. Obviously on these terms, whenever we *interpret* an object under reference we bring it into close and intimate connection with some schema of reflects under reference.

Let me now make a general statement based on *my* schema of interpretation.

In any organism, and between any two such organisms, there seem to be certain fundamental *kinds* of relatedness. By a kind of relatedness I mean one that is not, as I hold, derivative from any other kind. But these kinds are inter-related or correlated each with the others.

What, then, are these fundamental kinds? Among others I distinguish four: (1) temporal, (2) spatial, (3) physical, (4) referential.

This list is not meant to be exhaustive. There are, of course, relations of more and less and neither more nor less. Scientific inquiry cannot make progress without increasingly refined and delicate methods of dealing with them. These may be taken for granted. There may be another or other relations fundamentally different in kind. This, or these, here and now, I leave on one side as beyond our present purview. My aim is to concentrate attention on those four that I have emphasised as fundamental in the sense intended. Allow me to speak of them as TSPR.

My speculative hypothesis is that all these four kinds of relatedness are common to all organisms. Intrinsic to any organism is TSPR in intimate correlation as I use this word. And extrinsic to any organism—linking it up with other organisms—is TSPR. Relatedness within any organism is of the same nature as relatedness between organisms. That justifies us in speaking of one nature.

The position, then, is that neither T nor S nor P nor R is derivative from any of the other kinds or any combination of other kinds. We must accept them as given in the correlated

whole of nature. No one of them is "emergent" from any other of them.

But if the concept of emergence does not apply to these or other *kinds* of relatedness, to what does this concept apply? It applies to different *modes* within some kind. Thus in the atomic organism, the molecular organism, the living organism, there are different modes of that which we commonly speak of as physical (TSP) relatedness. But all are of the same kind—all susceptible of treatment in terms of action and reaction under TSP-correlation.

I am not here primarily concerned with emergence. I ask leave to take it for granted—not as an established truth, but as a truth-claim or hypothesis under trial. Emergent modes no less than fundamental kinds of relatedness are just to be accepted as given in nature. Why, in some metaphysically explanatory sense, they should be so given opens up a wholly different problem with which I do not propose to deal here and now.

Now we may, and habitually do, discuss TSP in abstraction from R. Why not, so long as we clearly realize what we are doing? We then get a highly emergent TSP-system and, in the case of the human organism, speak of this as the body. But the human organism in its concrete entirety is not a TSP-system only. It is a TSPR-system. To this system in its entirety the concept of emergence is applicable. And the highly emergent mode of referential relatedness as developed in the human organism we speak of as mental. Succumbing, then, to our proneness to abstraction, we are apt to conceive this highly emergent R-business as separable from a no less highly emergent TSP-business and call it the mind. The trouble, then, is to say how on earth what we have analytically sundered in vicious abstraction can ever be welded in natural unity.

There is, however, further trouble of a different sort centering in the divergent usage of the word "mental." In man as a concrete organism there are items of *minding*, such as *sensing*,

perceiving, remembering, thinking, and so forth, which go together in the substantial unity of what Professor Alexander and I call enjoyment. To this highly organized system of "imagery" Mr. Alexander restricts the word "mental." But some of these *'ings* have extrinsic reference to what is sensed, perceived, and the rest. All these are for Mr. Alexander distinctively non-mental. But in much current idealist doctrine they are commonly spoken of as mental.

Now the representative of common sense who claims to have a voice in such matters, may say that what is in the field of imagery, say, Jupiter as he expects to see the planet to-night, may well be called a mental image, but when he actually saw Jupiter last night the planet he then saw was not mental but just what he calls a material thing. I shall probably please neither party when I say that in each case Jupiter whether pictured in imagery or actually seen is an "object under reference." What I seek to emphasize is that the object I call Jupiter stands to me in the relation of reference. What, for me, this implies is that the planet and I, as concrete "organisms," are not only in TSP-relatedness, but also in R-relatedness.

It may, perhaps, be said that this R-relatedness is a one-sided affair. There is reference to Jupiter on the part of the observer: but there is no reference to the observer on the part of the planet. Practically no doubt that is so. But the second clause might be otherwise and more cautiously expressed. It might run: There is no evidence of reference to the observer on the part of the planet: hence one may safely assume that there is no such reference. Might we, at a stretch, parallel this statement with the following: There is no evidence that Lorentzian transformation is applicable when we are dealing with low velocities: hence we may assume that at these velocities there is nothing to which it is applicable? Should we not distinguish what is practically negligible from what we make bold to say is not there?

And is not the TSP-relatedness, which I speak of as influence, on like showing a one-sided affair? There is influence of the planet on the retina of my eye. Is there reciprocal influence of retina on planet? For all practical purposes in the interpretation of events in terms of TSP there is not. But might it not be safer to say: Such influence as there may be is practically negligible?

In any case, on speculative grounds I hazard the hypothesis that when any two organisms m and n are in those TSP-relations I speak of as influence of m on n and n on m those two organisms are also in relations of reference from n to m and m to n . But the "mode" of reference from observer to planet is at the highly emergent level of objective reference in human folk: whereas the reference from planet to observer may be so simple in mode as to be no more than what Lotze called "taking note of" (*cf.* Bacon as quoted by Whitehead, *op. cit.*, p. 58). Hence for all practical purposes this reference may be as negligible as is the influence of TSP-events in the observer's retina on like events in Jupiter.

So let negligibles be negligible on the understanding that what is negligible at one stage of scientific progress may be no longer negligible at a later stage.

There will still be trouble over what I mean by "influence." I restrict the use of the word to the universe of discourse, or interpretative story, of TSP-events. In some fashion, which it is for the physicist to discuss, there is transmission of influence (or of what I venture to call "influence") from one organism to another -- from one as "source" to the other as "recipient" of influence. A typical example is the transmission of radiant -- let us say electromagnetic -- influence. Here there is a time-interval between departure from source and arrival at recipient. There is also a space-interval between recipient and source. Hence changes in temporal and spatial relatedness are correlated with such changes in physical relatedness as are in evidence.

The outcome of the receipt of influence by the recipient organism is some change in the course of TSP-events in that organism. They may be speeded up, or slowed down, or shunted off in a new spatial direction. Such "acceleration"—in a wide sense of this word—of events in n , the recipient of influence from m , is the observable or inferable sign of P-relatedness of m and n .

I find it difficult to express the point of view I seek to develop without using some such word as "influence." But I wish to avoid the ambiguous word "cause." So I do not say, and it is not to be taken as implied by what I do say, that some change in the current course of events in n is "caused by" or "due to" influence. For all scientific purposes it amply suffices to interpret in terms of correlation of TSP where P does imply such TS-changes as fall under the generic heading of acceleration. This affords a means of distinguishing the P in TSP. But what I seek to emphasize by the use of the word "influence" is that when m and n are in TSP-relatedness there is a time-interval between events in m , as source, and some correlated change of the course of events in n , as recipient. This does not preclude the physicist from filling in this time-interval with such events as his inquiry into TSP-correlations may disclose.

No doubt what I seek to express may be, and I hope will be, far better expressed. As it is, exigencies of the occasion forbid enlargement by sundry safe-guarding clauses. Let it be granted, then, as a basis for further procedure, that when an astronomer sees Jupiter at some given "now" his retina, as part of his body, is recipient of influence from the planet he so names. May it not also be granted that there is on his part reference to the object of vision? The reference here is in that very high mode of emergent status that we commonly designate perception, backed up, so to speak, by reflective reference under schema of interpretation. If such reference be granted, correlative with TSP-influence from m to n , there is R-relatedness from n to m . But n as the

concrete human organism is TSPR. Hence correlated with R as a term in the relation of reference is a TSP-term in the relations covered by the word "influence." Furthermore, under perception, as naïvely interpreted, correlated with influence from the planet as a thing is reference to Jupiter as an object under vision.

For the generic word "correlation" it is convenient to use the specific word "concomitance" where some TSP-term, within or intrinsic to *n*, the concrete human organism, is co-present with an R-term no less constitutive of TSPR in its concrete entirety. Such intrinsic concomitance, as germane to my organic theory of nature, I must ask to be taken for granted, so that we may concentrate attention on the extrinsic relations between the organisms *m* and *n*—here and now the planet Jupiter and the observer as body-mind under concomitance.

Now when we interpret what happens we are pretty sure to use elliptical phraseology rendered familiar in common speech. We combine the story of influence and the story of reference. Common sense likes to have a bit of one nicely sandwiched with a bit of the other. And since the centre from which there is influence coincides as common sense thinks with the centre to which there is reference, surely the most sensible procedure is to call them both by the same name, say, Jupiter, the planet as thing and as object under visual reference. But what we want to do, here and now, is to correlate the system of TSP-events which constitute the planet, as thing and as source of "influence-from," with Jupiter, as visual object and as centre of "reference-to."

It seems, then, that under influence we have to reckon with a time-interval of *x* minutes between the "departure" of light-waves from the planet as "source" and their "arrival" at the retina of the observer as "recipient." But reference to the object is taken to be "instantaneous" on receipt of influence by some centre in the body (say in the occipital lobe of the brain) with which such visual reference to Jupiter is concomitant. If it be said that this is pure hypothesis, let us leave it at that. But

is it not the hypothesis on which the astronomer proceeds? It seems, then, that there is a time-interval between "influence from" and "influence on," but no time-interval between "reference from" and "reference to." There is no transmission of reference.

It follows that in elliptical phraseology, here already becoming suspect, we have to say that the observer does not see the planet where it now is at the moment of reference to it, but where it was when the light-waves started, say, round about 43 minutes ago—more or less than this by, say, 8 minutes according to "conjunction" or "opposition."

Of course, under astronomical schema one can calculate where the TSP-planet was x minutes ago and where it will be x minutes hence. We can chart its orbital course. This chart we can take in at a glance. It symbolizes now not only where the planet is now, but where it was some 43 minutes ago and where it will be some 43 minutes hence. But in the sky (the TSP-universe of events) it is somewhere now, and it is now nowhere else. By "it" we must mean the organism m at some passing phase of the course of TSP events within it as a continuous existent. This phase varies from moment to moment. May we speak of this phase in some sky-position now as an "existent" event? If so, its occupying some other position x minutes ago, and yet another position x minutes hence, are respectively "no longer existent" and "not yet existent" events. At least this is so on my interpretation.

On this showing there *were* TSP-events of which we say that they *are* gone by: and there *will be* such events of which we say that they *are* coming. What do we mean by saying that they *are* coming if they be not yet existent? What by saying that they *are* gone by if they be no longer existent? I think we mean that though they are as yet or no longer *existent* as TSP-events they none the less *have being* in the interpretative schema of our thought, that is, under reflective reference. On these terms what

we comprehensively speak of as "the future" and "the past" have being under reflective reference though the vast majority of the TSP-events to which we say, elliptically, that there is such reflective reference, are not yet or no longer existent.

Still speaking, as one must e'en speak, elliptically, I may now distinguish prospective reference to events of the future from retrospective reference to events of the past. Elliptical as is this phraseology, it seems pretty adequately to express what actually happens, namely, on one side of the account, that the not-yet TSP-event which is correlated with that which has being in prospective reference under schema, does in due course come along and enter the currency of passage through the "now" of existing events. If one be asked how to characterize this "now" we may take it to mean a thin slab of TSP-events wherein the temporal relations of before and after are less than some conventionally assignable value. Then, concomitant with some of these now-events, there is reference from the organism within which these events are existent in passage: but there may be thought-reference to the not-yet existent future or the no-longer existent past.

In the case of the astronomer, therefore, and of one who has some knowledge of astronomical interpretation, we have (1) reflective reference under schema, (2) objective reference under vision, and (3) the TSP-events which are correlated with the reflects and objects under reference.

Familiar as it is to us highly sophisticated folk, the TSPR-correlations involved in such interpretation seem simple enough. But it is rather a tricky business: and in the course of sophistication common sense has sustained some rather disquieting shocks. To put it crudely, common sense supposed that it was under vision clean up against TSP-events now and there. But common sense has to learn that when he observes Jupiter he is indeed up against an object under reference now and there, but that the TSP-events occurred, say, 43 minutes ago where the planet then was.

Common sense, when duly sophisticated under adequate tuition, has probably learnt that in all visual reference—perhaps in all modes of extrinsic reference to an organism as source of influence (even under what we commonly call contact)—what has objective being now must be correlated with TSP-events which are, if only by a little, gone by and are no longer existent, and which, when they were existent, may have occupied a position other than that to which their objective correlates are referred.

The emphasis is on the necessity of TSPR-correlation. But long ere common sense became highly sophisticated or if the word be preferred “rationalized”—through science, it played the game of correlation. To take a suitably obvious and trivial instance, the common-sense cyclist sees a row of telegraph posts along the road before him. Each is an object under visual reference. Each has for him what we may call its S' extension in length under reference. But what he may stoutly affirm to be its “real length,” in the TSP-system taken in abstraction, is quite different. None the less he has long ago learnt to correlate one with the other, aided perhaps by some very elementary scientific tuition affording a pretty simple schema of interpretation. He can say: When from such and such a distance it looks so long I happen to know that it will look so much longer from half that distance: and that if I get off and measure it with a foot-rule (though, as a matter of fact, I shall take this for granted) I shall get its “real length” by a simple process of superposition of foot-rule on pole. And so on. He has learnt to play the game of correlation, which after all is the game of interpretation—a game that, as I judge, the most intelligent of apes has not learnt to play.

It is worthy of note that our cyclist as he rides gets at the so-called “apparent length”—what I called its S' extension—by *estimation*. But he can, as I assume, approximate to the so-called “real length”—its S -length—by measurement, that is,

foot-rule superposition. If, however, he be a photographer, he can, from a measurable distance, record on suitable plates that which *is* measurable. This, too, is what he calls a "real length." This he may compare, under schema, with the no less "real length" of the so-called "optical image" on "the photographic plate of his retina." But it is on this TSP "image" that his estimations are based under concomitance. Hence further opportunities of correlating TSP with TSPR, or, as I put it, the story of influence with the story of reference.

Let us now take, as a further instance of playing the game of correlation, a little bit of experimental work.

Cut out a disc of cardboard 10 inches in diameter of that very light-grey shade which we call "white." Draw circles thereon of 5 and $5\frac{1}{2}$ inches diameter. Paste on to the area included within the inner circle a piece of paper of that very dark-grey shade which we call "black." Between the circles paste on three "black" segments such that this intervening ring on the disc has 50 per cent. of white and 50 per cent. of black by angular measurement.

Of course, this disc whatever else it may be - is an object under immediate visual reference so long as we look at it. But what we propose to correlate is a set of *R-estimations* with a set of *TSP-measurements*. Quite provisionally, then, let us regard seeing such a disc as I have described as ancillary to measurement. And let us call what we get through manipulation, thus aided by vision, metrical results. Then we have to correlate certain metrical results, assumed to be close approximations to TSP-data, with certain other results which are susceptible of estimation only. These in their salient emphasis are R-data.

Let us now attach our disc to a suitable piece of apparatus and set it in rapid rotation. The outer and inner portions look much the same as before; but the intervening ring as objective under vision has a quite different appearance. It is a fairly uniform

grey ring. What one might expect under prospective reference is that, since the metric values of white and black are still the same -50 per cent.--the swiftly succeeding influence on the retina would be correlated with an R-result giving a mid-grey of a shade half-way by estimation between white and black. That, however, is not so. It gives a very light grey --so light in shade that one may say that it is nearly white.

If, then, we want to get a ring that looks mid-grey we must paste on more black. We may then find that by angular measurement, say, 85 per cent. of black and 15 per cent. of white gives what we estimate to be a fairly good mid-grey when the disc is rotating. The exact metric values will depend on how dark is the grey we call "black": how light the grey we call "white." We take here a pretty full "black."

We may now proceed so to arrange matters as to have three rings between "black" and "white," such that the ascending shades of grey from "black" to "white" are judged to be equal steps upwards. What metric increments, say, of "white," give this R-result? Approximately 4.5:10.5:25:60 in percentage numbers. These are approximately in G.P. with the factor $r = 2.3641$. It seems, then, that what are judged to be equal as R-steps are correlated with metric increments in G.P. Can we interpret these results save by correlating influence from source on the retino-cerebral system and reference to the object of vision?

But it may be said that the body *n*, as recipient of influence, is a TSP-system no less than the disc, *m*, as source of influence. That is so. But reference to the object of vision is concomitant with TSP-events in the recipient *n*. There and there only do TSP-events of the highly emergent modes which we call physiological or neural occur, and only when they do occur in *n* is there that mode of reference which gives us an object under vision. Surely the need for correlation of things and objects is thus re-emphasized. In brief, the interpretation of the facts given under

vision cannot be other than a concrete TSPR-interpretation. That is the essential point.*

* The still incomplete results I have obtained seem to be accordant with the Weber-Fechner correlation.

One must bear in mind, however, that what we call "white" is not, so to speak, "angelic white"; nor is what we call "black" diabolic black. Each is something that is given under human conditions of vision. In other words, the best "black" we can get is tempered with some angelic positive; the best "white" contains some diabolic negative.

Bearing this in mind, one may select a human "white" and a dark grey we call "black" such that in a set of rings the metric *increments* of "white on black" give the sequence—

$$0 : 6\cdot6 : 13\cdot3 : 26\cdot6 : 53\cdot3.$$

This is a G.P. series with the factor $r = 2$. The *summed* increments of "white on black" will then be

$$0 : 6\cdot6 : 20 : 46\cdot6 : 100.$$

This disc on rotation affords to vision a series of greys estimated as giving like steps in shades of grey upwards from "black" to "white."

Note that it is for convenience of treatment that we say: "Black" shall be our 0; "white" shall be our 100. We then deal with percentages.

Now, starting with our last increment $53\cdot3$, and dividing by 2, we get the preceding increment $26\cdot6$, and so on down to $6\cdot6$ our first increment under observation. But if we divide this by 2 we get not 0 but $3\cdot3$. The inference seems to be that what we conventionally call "black" falls short of diabolic black by $3\cdot3$ per cent. of "white." If this be disputable let us assume that it may be so.

Then what we are dealing with is a selected bit of a logarithmic curve (as such asymptotic) with a limited range between beyond "black" on the one hand and beyond "white" on the other hand.

Let us assume that the inferred $3\cdot3$ per cent. of white in the "black" with which we start increases in G.P. within our limited range.

Add then these inferred increments to those we get under observation. Italicizing these we have the series—

$$3\cdot3 + 6\cdot6 = 10 : 6\cdot6 + 13\cdot3 = 20 : 13\cdot3 + 26\cdot6 = 40 : 26\cdot6 + 53\cdot3 = 80.$$

The next earlier stage would be

$$1\cdot6 + 3\cdot3 = 5.$$

Here not only the increments but the summed increments are in G.P. with $r = 2$.

The further inference, then, is that what we call "white" is a very light grey which falls short of angelic white by 20 per cent.

Consider now a further detail. We have in the rotating disc as an object under visual reference three grey rings intervening between black and white. But the trouble is that, no matter how accurately the metric segments of black have been pasted on, none of these rings is for vision uniform in shade. Each has a perceptibly darker border where it adjoins the lighter ring, and

We have thus rearranged our percentage sums so as to provide for beyond "black" and beyond "white" in the complete logarithmic curve. Beyond "black" is less than 5 per cent. : our black is 5 per cent. ; our dark grey, 10 per cent. ; our mid-grey, 20 per cent. ; our light grey, 40 per cent. ; our white, 80 per cent. ; beyond white is more than 80 per cent. Why the hinge-point 20 per cent. is common to our observational scale and to the full logarithmic curve will probably be sufficiently obvious. It is common to the selected bit of the curve *within* our limits and to the full logarithmic curve which includes that which lies *beyond* these limits.

Now, though we can approximate in theory to angelic white and to diabolic black—both unattainable since the logarithmic curve is asymptotic—we are observationally restricted to such increments as can be discriminated under the conditions of human vision.

But further experimental inquiry is opened up. We have dealt with readily perceivable increments, such as to give our suite of greys with what are estimated as ascending steps with like difference in shade. But we can determine the just perceivable increments.

We then ask : Taking our "black," how much "white" is required to afford a just perceivable difference in shade of grey ? Taking our "white," how much "black" is required in order to give a just perceivable darker ring on the background of our white disc ?

My results so far (subject to revision) are approximately .06 per cent. of "white on black" ; 1 per cent. of "black on white" ; and .24 per cent. for the just perceivable increment of "white" on the increment which gives our mid-grey. These values nearly accord with a G.P. ($r = 1.012$).

I cannot here follow the matter up any further. If these results be accepted (again subject to revision) the number of just perceivable steps between "black" and "white" can be calculated (say 232) ; and one can bring into relation the readily perceivable increments and the just perceivable increments.

But throughout the whole business, from first to last, is there not need for correlation of metric results obtained under manipulation of the disc, when it is still, with that which is given as an object under reference when the disc is swiftly rotating ?

a lighter border where it adjoins the darker ring—a well-known “contrast-effect” so-called. So more experimental work is suggested. Add, subject to G.P., progressively more black towards the lighter border, and progressively more white towards the darker border. The disc, when still, is an odd round-shouldered affair. But set it rotating. The rings look clear cut; and each is approximately uniform in shade from border to border. One has got rid of and can measure the so-called contrast effect. Surely there is here further need of correlating metric influence at source, with what is given in the object under visual reference.

I select from many others two or three more cases which call for consideration in terms of correlation. Let us take a disc similar to that with which we started. But let the outer and inner areas be covered with neutral grey paper of a selected shade. Then paste on the intermediate ring segments of a suitably chosen green and a suitably chosen purple. Let the segments have the metric proportion (in the case before me) of 41.5 per cent. purple and 58.5 per cent. green. On rotating, the intervening ring gives a colourless neutral grey. In the object under visual reference all trace of colour has gone.

Now substitute all purple in the outer area: all green in the inner area leaving the intervening ring untouched. On rotation this intervening ring is no longer a uniform neutral grey. Owing to contrast effect it looks greenish where it adjoins the full purple: purplish where it adjoins the full green. Correct this by adding some green near the one border and some purple near the other border. On rotation the mid-ring now looks neutral grey throughout its breadth. It may, however, be observed, piecemeal so to speak, through a small tube which isolates for vision a bit of the ring in all its breadth, but cuts out of the field of vision the full green and purple which induce the contrast effect. Then it is *not* a neutral grey. It has greenish and purplish borders from the colours introduced to correct the contrast effect.

Lastly, substitute for green and purple suitable red and blue. In no proportion of these colours does the intervening ring look neutral grey. In all proportions it looks purple. Let us get a mid-purple, by finding experimentally the necessary proportions of red and blue. Owing to contrast effect it inclines on rotation to red-purple near one border; to blue-purple near the other border. Correct this by addition of blue on the one hand and of red on the other hand. This gives uniform purple when the rotating disc is viewed as a whole. But a bit of the ring isolated by means of the tube is not uniform. It is reddish-purple near one edge, blueish purple near the opposite edge.

Of course, these experimental results are in line with sundry generalizations with respect to "complementary" and "not-complementary" colours. But what, throughout such observations, we have to correlate is influence in some mode from source, and reference in some mode to object under vision. And my contention is that only on a basis of TSPR-correlation can the concrete phenomena be interpreted. Furthermore, what is thus given under R is concomitant with TSP-events in *n*—*in the recipient organism*. And only when these very specific and highly emergent *n*-events are existent is there reference to *that* which has objective being.

I am well aware that the facts I have adduced can be interpreted—but not, as I think, so readily or so satisfactorily interpreted—on a sensum-theory. I seek only to present, without polemical discussion, an interpretation on a radically different hypothesis. *Utrum horum maris accipe.*

Why have I dealt at such length with these disc-observations? Partly because I have for more than a quarter of a century had my hand and eye hard up against certain concrete facts, as I deem them; partly because they seem to demand TSPR-interpretation; and partly because, so far as R is concerned, we are dealing with objects under both visual and tactual reference—

the latter with fingers suitably extended and armed with instruments of some precision. We are correlating what is seen in swiftly rotating discs (and only thus become objects of a specific kind under visual reference) with measurements under the manipulation of discs which are not rotating and, as thus seen, are specifically different objects under visual reference. I have assumed that in the still disc under manipulation the metric results we obtain bring us as near to TSP-interpretation under abstraction as we can get. But if it be said that the sectors on the still disc are in some sense more "real" than the greys or purples that one sees on rotating discs, I must ask in what sense an approximation to TSP-events in abstraction gives more reality than TSPR in concrete experience. I do not say that there is no sense in which it may be said that TSP-events may be defined as pre-eminently real. I only urge that there is a sense in which TSPR-interpretation gives what may be, somewhat differently, defined as pre-eminently real.

We have come into touch with certain so-called contrast-effects. They seem to me to be very real in some sense, and somewhat importunately to demand R-interpretation on my theory of reference. I know they may be interpreted by thorough-paced new-realists on different lines. But my aim (I repeat) is to expound a theory not, here and now, to criticize another theory. It is more to the present purpose, then, to recall that these so-called contrast-effects illustrate what used to be called psychological relativity.

We come now to what is spoken of as physical relativity. And here I speak with bated breath. And perhaps the less I say the better, since probably what I do say will enlist but little sympathy. Furthermore it may be urged—and alas! truly enough—that in the little I say I shall be talking of matters the mathematical treatment of which lies far beyond my sadly limited grasp. With the humility of fully realized ignorance I accept the position. But there are aspects of the problem with which

I am, perhaps, not wholly incapable of dealing—save in so far as I am quite unfit to deal with the topic in hand.

In connection with *this* topic what are the crucial questions? May I put them thus? Do the phenomena fall under the heading of objects under reference, in this case primarily visual reference? Is what has objective being under such reference correlated with a set of TSP-events which had existence in some source of influence? Can we get at these events in such wise as to deal with them, at source, metrically by superposition of measuring rods and the like--thus to get at them *in m* and not only in some *n* as recipient of influence therefrom? If not, can we confidently assert that what is given objectively from the referential point of view of the observer is an exact replica of the TSP-events at source?

In a little further detail, and in a selected instance, let us grant that as object under reference from the point of view of some observer--or of some supposed observer--there is always call for Lorentzian transformation, where our P-factor may be taken as negligible. What does this transformation give us? Is it the set of TS-events at source; or is it a set of T'S' events as modified under R? I leave this in the form of a question.

But if what the transformation gives us is a transformed "object under reference," have we any ground for saying that the TS-events at source are themselves in any wise or in any degree transformed? We are taking S-relatedness as given—or such as we infer would be given—under what I have spoken of as "metric" superposition or other direct measurements at source. In the coin, of which this Society has heard so much and from so many points of view, we have transformed S'-relatedness in objects under reference, not, as I think, transformed S-relatedness in the coin as a TSP thing. This, of course, is not Lorentzian transformation, with its correlation of T'S', if the measurable space-interval between all parts of the coin and observer remains constant. But, on the hypothesis I seek to present, does

Lorentzian transformation afford that which radically differs in principle?

When we deal with events in which, under observation, P is not negligible—where acceleration, somehow transformed, comes into the picture—the transformation-formula becomes bewilderingly more complex. But again one must ask: Which is transformed, nature taken in abstraction from reference, or nature as a system of objects under reference, and no less real for us?

In any case let us clearly realize that if it be nature in the latter sense—that accordant with an organic theory of nature, and not discordant with Professor Eddington's characterization of the external world as "a synthesis of appearances from all possible points of view"—even in this sense no single item in the most accurate and refined outcome of modern inquiry into relativity is in any way impugned. What it comes to is this. The object under visual reference is not an exact replica of the TSP-events at the source of influence; it is a transformed $T'S'P'$ -correlate. And under transformation neither T' nor S' nor P' remains unaffected. Hence there is need for much subtle correlation of values as given under reference with the metric values that might be obtained at source could we transport ourselves there to measure them by methods of foot-rule superposition. Under reference T is transformed to T' , S to S' , P to P' . As transformed they require new correlation formulæ. There is that give and take as between T' and S' and P' (*e.g.*, mass under velocity) with which the literature of relativity has made us familiar in spite of mathematical difficulties to be overcome. But—and herein lies the obnoxious taint of heresy in one who is still unconverted, and hence unrepentant—no $T'S'P'$ transformation alters one whit the TSP-relatedness that obtains at the source of influence on recipient eye or photographic plate.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C. 1, on November 15th, 1926, at 8 P.M.*

II.—EVOLUTION AND CONTINGENCY.

By J. C. McKERROW.

I HAVE a fair pretext for offering what is a purely scientific speculation to the consideration of this society, namely, that it deals with concepts in which the society is peculiarly interested. This is only a pretext, the real reason being that my speculation lies in a No Man's Land---no scientific man's.

This is by way of disavowal of any ability on my part to enter into logical and metaphysical considerations arising out of my theory. I am a naïve biologist attempting to write a supplementary chapter to "The Origin of Species." (I use the word "biologist" here in a sense which etymologically is its proper sense, not in the sense in which "biology" is often taken to be a comprehensive term meaning zoology and botany, the study of living things.) I shall probably be guilty of logical and metaphysical crudities in trying to say what I mean, and must ask my audience to use their good-will to discover my meaning.

I need not try to define or describe the complex activity we call life, or enter into the hypotheses as to how life "emerged." My interest is in the historical fact of the differentiation of some early form of life into the specifically animal type. About that I have a very definite theory, and if it is correct, "experience" is not a fact, it is the delusive appearance of a fact. The fact is quite different.

I regard the evolution of a motile living thing as a preliminary step to the evolution of animals. I assume that forms of life arose in course of evolution which moved incidentally to their

living-process, *i.e.*, their locomotion was purely physiological. Their physiological activity, however, was not purely mechanical—a point I shall return to later. These motile forms of life were not animals, and I hesitate to say they were plants. They were prior to that differentiation.

Now certain kinds of physical change occurring in a certain degree of intensity in the neighbourhood of living things, whether motile or non-motile, would occasion changes in the physiological activity of the living things. The equilibrium towards which living systems tend, I call “viable equilibrium.” (Chemical actions also are “affected” by changes of their conditions.) When—if it ever did—the physiological change thus occasioned became habitually the occasion in motile forms of life of a change in the direction of their motion, then such forms became specifically animal organisms. They would appear to a modern psychologist, their analogues to-day do appear to most psychologists, to be aware, to feel and to will. On my hypothesis this is a misinterpretation of the facts. Viable equilibrium is restored in a new manner—the manner that marks the organism as an animal, a manner made possible by the development of motility, a merely physiological motility.

It will be clear to you that all depends upon the term “habitually.” The term “habit” implies to most psychologists a mental activity. With me it means activity, not mental, repeated in circumstances similar to those of the earlier occurrence. The similarity of the circumstances is not perceived by the organism; it is the organism’s activity which is its sole warrant, and ours, for assuming, as we do “consciously” and the primitive organism does by implication, that the circumstances are similar.

But what about the first occurrence? Why did any motile organism ever change the direction of its movement on the occasion of a physiological change occurring in it? On my

hypotheses it was incapable of being aware of the change, of feeling its painfulness and of willing the act; and purely mechanical determination is, to-day, I think, out of the question. It is simply by way of excluding these alternatives that I say the first occurrence was accidental. I "define" accident in this negative, and limited way. It is by accident that newness emerges and by repetition that biologically useful, or better, biologically possible, novelties are conserved.

Habit, that is, accident and repetition in similar circumstances, is, for me, the essential principle of living-activity. That is why I denied that physiological activity, in animal or in plant, is purely mechanical. I do not believe that it is reducible to a physico-chemical necessity. (I believe that so-called physical necessity will reduce to habit.) The physiological processes in every species of living thing are modified by the history of the living things from the beginning of life, and in every member of a species they are modified by the history of the individual. Naturally, the modifications are slight as between members of a species compared with those between different species. But it is common knowledge that physiological idiosyncrasies can be acquired.

I need not give my account of "mental" evolution. With a big enough assumption anything can be explained, and you will notice that I make a pretty big one—one, you may think, that no-one with any sense of parcimony would allow me. I need only draw a parallel between my first principles and those from which most psychologists begin. Instead of a subject attending and acting voluntarily according to its feelings, purposes, etc., I have an organism reacting to physical changes, *not* voluntarily, as it has reacted before. It is obvious that these two accounts, in each case with the necessary allowance of emergences, will be as applicable to man as to the first animal. As to their relative preferability, that is, no doubt, a matter of temperament, but

since my interest in what I must not call "psychology" arises from a violent dislike of the notion of the conscious subject with its tangled trinity, not to say, multiplicity, of faculties, there is no choice for me, provisionally, between that way of thinking and any other that *can* be maintained.

I will refer briefly to some of the epoch-making emergences of life. It will have been observed that my primitive animal responds only to physical changes as yet, and only in one way to these, namely, by avoidance. It is fed incidentally to its living process. If we conceive it as a conscious subject, it is not yet capable of the hypothetical mental process called "noetic synthesis." It does not "intuit things." It does not react to *objects* in the specifically animal way. But that in course of evolution animals could have developed a habit of feeding themselves, instead of being fed, without any new development, of "conation," etc., is sufficiently evidenced by, for example, the insectivorous habits of plants. These react to "things" with a quite remarkable degree of "discrimination," and if they, why not their motile cousins? The biological utility of "going to it"—if you can go—is obvious.

Here I may refer to a well-known distinction of animals into large- and small-brain types. This distinction I correlate with a general and a specific type of animal reaction. The general type of reaction is the pre-condition of "intelligent" action. No hard and fast line can be drawn between "instinct" and "intelligence." The behaviour of insects is largely instinctive, consists largely in pre-determined reactions to specific situations; that of the dog is largely intelligent; dogs "learn by experience."

Learning by experience, the fact, if not the words, does not imply consciousness. I can describe the fact without any such implication. Unviable activity tends not to be repeated. This is the burnt child's warrant for avoiding the fire, and it is a *nearly* necessary consequence of the general type of behaviour.

Such behaviour, without this modification, would be distinctly unviable. With this modification, it leads on, through the vertebrate series, to the human reason.

The young chick pecks a bit of red worsted ; that is right and proper ; the young chick is born with a tendency to react in such a way to such an " object " ; it has a general tendency. Its action is an integral part of being a chick. Immediately, however, it rejects it. Again, quite right and proper ; the chick is born with a tendency to react in that way to certain physiological changes (in this case, in taste and smell organs). But the cycle of activities has not advantaged the chick at all. Without the modification that unviable activity tends not to occur, the chick with its general tendency to peck at all peckable objects would be at a great disadvantage in the struggle for existence. Ninety-nine per cent. of its efforts might be labour in vain. Indeed, once it had struck an unviable object, it would be a chick finished. But for " learning by experience " the general tendency would be unviable, i.e., there would be no organisms exploiting it. Of course, a chick doesn't eat worms because it likes them, it " likes " them because they are the sort of thing it eats. " We do not desire a thing," says Spinoza, " because we think it good ; we think it good because we desire it."

So much for living things below man. In approaching the subject of the emergence of the peculiarly human type of activity I must walk delicately. I am in the position of the bargee who was silenced in argument because his opponent had used all the (relevant) words. All the words relevant to a discussion of the human understanding are through-and-through subjectivistic. Language was made by subjectivists. It is here especially I must rely upon the good-will of my audience and a liberal allowance of inverted commas.

I will approach the question of the emergence of man by way of a parallel with my account of the emergence of the animal.

The pre-condition, corresponding to the development of motility in the animal case, is the development of speech. But a talking animal (otherwise like a man), is no more necessarily a man than a motile organism is necessarily an animal. The motile organism does not become an animal unless and until it acquires the peculiarly animal habit of changing the direction of its motion on the occasion of physiological changes. Similarly, I hold that an organism, otherwise like a man, which, or who, could express his "desires," "emotions" and "opinions" to his fellows by means of vocal sounds, and "understand" the vocal sounds of his fellows, is not necessarily a man. But the step required to make him a man is as short, the contingency as probable, as in the case of the emergence of the animal or of "learning by experience." I should be surprised to learn that there are any motile organisms that do not exhibit the animal mode of reaction, or any animals exhibiting a general type of reaction that do not "learn by experience," that is, drop unviable modes of reaction, or any talking animals that are not men.

The talking animal I speak of is just an animal because all his "ideas" arise out of his "sense impressions." His propositions deal with matters of "common knowledge." He has names for "things" and "qualities" and "actions," can give and receive information. The biological utility of this is beyond question. But some new emergent relation between the talking animal and his environment is requisite to make the talking animal a "thinking," the "thinking" animal, man.

The motile organisms which developed the animal habit prospered because of the great biological utility of that development. The utility of the merely motile habit of life is negligible compared with the utility of the habit it makes possible. So the utility of talking, great though it is, is negligible compared with that of "thinking." We have only to think of the aboriginal

Tasmanians who recently became extinct and of Athens over 2,000 years ago.

"Thinking" is not reducible to talking any more than animal behaviour is reducible to motility. Animals emerged when motile organisms "discovered," contingently, the biological utility of changing the direction of their motion according to circumstances, of adapting their situation to themselves instead of adapting themselves to their situation, as they had hitherto done. A similarly epoch-making discovery was made when some talking pre-man discovered, contingently, that he could modify his situation by talking. Or did he, perhaps, discover the biological utility of persuading his fellows that he could modify situations by talking? It may be that the first medicine-man, the first priest, magician, scientist, philosopher, theologian—everything but logician—the first of "those who know"—know things outside common knowledge—was a fraud. It is a historical mystery that will never be solved. It is at least equally possible that he was in good faith in claiming to be able to charm away warts or disease or drought. The canons of induction had not yet been formulated, and disputed, nor was inference merely probable. What the first man thought or said was true, because he thought or said it. (I refer, of course, to things outside common knowledge, not to the facts of "sense-experience.") Flesh and blood had not revealed it to him; it was inspired truth. (Cf. Spinoza's contrast between the methods of Moses and St. Paul.)

Thus man emerged when he went beyond his sense-impressions and "believed" more than was revealed to sense, i.e., acted as if he knew more than was revealed to sense. To the common knowledge, which he shared with lower animals, about the things of daily life, he added a transcendental knowledge. He "discovered" the "world of ideas" as the animals "discovered" the "sensible world." And he did it by accident, as they did. And he was mistaken, as they were.

What the first men made of the world of ideas is immaterial, whether a plausible guess can be made or not. The important thing is that they believed more than they perceived. Plato made the world of ideas the real world, of which the sensible world is an imperfect representation. It was the most natural thing in the world, if one assumed the reality of mind, to give priority in degree to the eternal truths of mathematics over the mutable truths of sense-experience. Mr. Russell had not yet said that in mathematics "we never know what we are talking about, nor whether what we are saying is true." And since Plato, the world of ideas has been explored by a succession of thinkers up to the present moment. I do not know how far my account of the emergence of the thinking animal, man, given largely, as it has been, in subjectivist terms, will seem to you to account for your present activity, if any, on non-subjective lines. I myself have no difficulty in regarding myself as an animal communicating to you certain propositions, precisely as I might communicate to a dog the proposition that a rat is about, or as a dog might communicate to me the proposition that a stranger is about. The propositions are more complex certainly, and relate to matters that are not common knowledge, that are transcendental knowledge, that is, *not* known. I may be as entirely wrong as my hypothetical first man was. I am communicating to you propositions the truth of which I do not guarantee. I have imagined them. The "reason" why I am doing so is that I am dissatisfied with the imaginations of other people on the same subject, am more satisfied with my own and hope that, in course of time, others may find them more satisfying. My "dissatisfaction" does not imply that I am a conscious subject. I use that subjectivist term to reduce my motive in speculating to the animal level. And I have already shown how animal behaviour need not necessarily be interpreted on subjectivist lines.

Supposing then that speculation about what we don't "know," say what is going on next door, or, invisibly, before our eyes, is a very natural extension of talking about what we do "know," say, that this table, as has been remarked before, is green, and supposing you will allow that our ability to make such a remark is a matter of natural evolution, supposing, in short, that the thinking subject, as such, is disposed of, that is to say, that thinking is merely a kind of living activity peculiar to man, arising out of inter-subjective intercourse and mediated through speech, what account can be given of the proposition about the greenness of this table? My account would be that I have been taught to associate the kind of retinal change now occurring in my eyes with the word "green." My "experience" of green is irrelevant, is a misinterpretation of the facts, arising out of the analysis of the total situation into subject-object, instead of organism-environment. The qualitative aspects of the world presented to the "consciousness" of any animal are conditioned by the nature of the animal. The unanimity of men about the colour of this table would be no guarantee that it is really green, or that colours exist in Nature at all. I have a sense of colour because it is important for me to be able, for example, to spare the green and take the ripe. To draw metaphysical conclusions from such a very commonplace, utilitarian fact is extremely ill-advised. I do, as a matter of fact, in practice differentiate between "objects"; "I" "choose" a "large" "red" "strawberry" in preference to a "small" "green" "strawberry," but the inverted commas imply that "I" refuse, merely on that account, on the one hand, to consider myself a conscious subject, capable of choice, and on the other to be committed to the proposition that colours and strawberries occur in Nature or to any proposition about space. One may believe it highly probable that the difference one is "aware" of between the two "objects" corresponds to a difference in the respective retinal changes (as

far as I know, this physiological difference has not been experimentally demonstrated), and that the retinal difference corresponds to a difference in the respective physical (photical) conditions, to which the retina reacts, and that the photical difference corresponds to a difference in the happenings where the alleged strawberries are. As to these happenings I look to the physicist for an account of them, but whatever his account may be, my awareness of green remains equally delusive, relative to myself, to the kind of animal I am. The senses of all of us tell the same story; that does not guarantee its truth. The physicists, like the mathematicians, disclaim any knowledge of *what* they talk about; the knowledge they profess is that of the *order* of Nature. It may be true that *my* "awareness" of green is always occasioned by ethereal vibrations of such and such a kind, but the subjective end of that couple is in the last resort accidental. Such vibrations do make us aware of green, but they might equally well have made us aware of some other colour. *Dis aliter visum.* (111)

This "explanation" of sense experience would be profoundly unsatisfactory to plain men—as unsatisfactory as Bishop Berkeley's explanations were to Dr. Johnson. But I did not offer to explain "experience." I said that experience was a mistaken metaphysical assumption. No one to-day asks a physicist to explain force. Or if anyone does, the physicist replies that force is an obsolete idea formerly in use to interpret physical events, and if the enquirer is interested in the events rather than in the idea of force, he goes on to interpret them in the up-to-date terminology. If the enquirer is interested in "force," he is content, if satisfied of the authority he has consulted, to know that it is a mistaken hypothetical object, and will no more demand any further account of it than he would an account of the anatomy of angels' wings. You cannot expect from me an explanation of a "fact" which, I doubt, and which, for the sake of argument, I am at the moment denying. (And when

I remember the discussions I have heard about the greenness of this table, I cannot but "feel" that there is a great deal of honest doubt among those who profess to believe what I do not.) I am a living thing, an animal, a man, and these terms indicate an evolution in the modes of action of living things. But what is concerned throughout is life. As a living thing, a complex chemical system, I digest my food, breathe, etc.; as an animal, I go to my food, instead of, like a plant, waiting for it; as a talking animal, I talk about food; as a thinking animal I speculate about food, *i.e.* say more about it than I can know by acquaintance. And all this is living activity. There is no emergence of some entirely different kind of activity, namely, mental. We all feel like conscious subjects, perceiving, feeling, willing and knowing, but it is a weakness of the flesh, of the plain man who obstinately resides in the most speculative thinkers. We ought to "intuit ourselves" as living, as possessors of a vital spark, as the mystic intuits himself as possessing a spark of Divinity, and attribute all our faculties to life, not to ourselves. What have we that we have not received? What are we but alive? "Those who believe that they speak, or are silent, or do anything else from a free decree of the mind, dream with their eyes open—*oculis apertis somniant.*" (Spinoza.)

I have given some slight account of animals and men in terms of my very large assumption. It is, doubtless, that assumption you will criticise. Of two equally tenable assumptions it is admissible to prefer one, and, as I said before, I prefer the concept of Habit to that of Mind.

The chief reason for this preference is that I can attribute "habit" to plants, and I cannot attribute "mind" to them. The really thorough believer in mind, of course, can endow not only plants, but pebbles and atoms and electrons with their proper degree of sentience. Such a believer seems to me impregnable. Continuity requires that what is sauce for animals

should be sauce for plants, and I find it easier to make animals creatures of habit than to ascribe any degree of sentience to plants.

Again, a logician has asked why I believe more in life than in mind, and remarks that they "seem to be on the same level as regards objective validity." I can only reply that they don't, to me. I do not meet other minds, indeed I do not meet my own mind. Some introspectors have become aware of their "selves"; I have never been aware of mine, and it seems to me a logical or physical or metaphysical impossibility to do so.

Habit is a phenomenon we are all familiar with, and to common-sense habitual acts appear to be precisely acts in which our "minds" are not engaged, acts in which *we* are not on. We are simply repeating a previous mode of action in similar circumstances. Of course the "mind" may be "attending," though "we" are not; we may be unaware of the mental process under the conditions in which it determines habitual acts. But a mental process of which we are unaware seems to me somewhat mythological.

What is my own distinction between our "conscious" and our "unconscious" acts? I hold that we are "conscious" in so far as we act contingently, and "unconscious" in so far as we act "habitually" (popular usage), that is, in so far as our action is determined by our past history, in so far as it is repetition in similar circumstances. The "conscious" act is the contingent action of the animal individual, analogous to the contingent action of our first animal ancestor in changing the direction of its movement. It is an act of the peculiarly animal type of reaction to change. In the lower animals "attention" is an abstraction for us from the fact that they react in some manner appropriate to their kind and to the change in question. With men, and especially with philosophers, the appropriate reaction is very much less in evidence, so that I am unable to say whether you are attending to me or not.

"Attention" itself, however, is largely determined by history. Some of us attend to one kind of thing, some of us to another; it depends, as the subjectivist would say, on our "interests," what we shall attend to. And we are determined by our history, phylogenetic and ontogenetic, to have certain "interests." We were determined to be men, and not pigs, by the circumstance of our parentage, and to have interests accordingly.

But this is a very mild determinism. Observe the nature of the law under which we live. "Action tends to be repeated in similar circumstances." A given animal is a living activity repeating previous modes of activity in similar circumstances according to its history, phylogenetic and ontogenetic, and the nature of the circumstances. All the determination refers to past events. In the present moment we are free, activity is contingent, and we exercise that freedom in every "conscious" act. (Cf. Bergson.) It is a limited freedom. Pigs can't fly, and I can't read "*Principia Mathematica*." But of all the actions physiologically, animally, humanly or individually possible to us in a given situation, my "law" debars none from occurring. All our behaviour is in my sense habitual, including "conscious" behaviour, since we are determined by habit to "attend" to particular kinds of events. But habit implies contingency, not only in the first instance but throughout. The contingency is disguised very much in certain forms of living-activity, so that physiologists may hope –and what a queer thing to hope!– to reduce physiological activity to physico-chemical necessity. It is very much concealed in the highly specific instinctive behaviour of some insects. It is so much concealed, from us, in the lower animals, that Descartes could regard their activity as mechanical. It is so much concealed in ourselves from ourselves that the freedom of the will is, I believe, still an open question. The theory of habit saves the freedom of the will at the cost of giving up the will. That is to say, if a plain man were to ask me if the will is

free, I should most certainly reply in the affirmative. I do not agree, speculatively, with the way he puts the question, but I know what he means, and my own interpretation of the facts, translated into the terms of his, emphatically declares for the freedom of the will. So far as living activity, as such, is determined, it is determined by habit, and habit is not reducible to mechanical necessity. Hence the possibility of the sinner becoming a saint. Our habits at any time may change. Such change is notoriously rare, of course, habit, in the words of the proverb, being second nature.

So far as living-activity is not determined by our past, is not mere repetition in similar circumstances, so far as it is contingent, so far is it "conscious" activity. An object in the visual field is not necessarily "seen." The retina acts according to *its* habit, but the retinal change does not determine "seeing." The object is not "seen" until the "subject" "attends" to it, i.e., until the individual reacts to the physiological change in the peculiarly animal manner according to its habit. The interests of men being largely of an academic, not of a practical kind, the reaction to the physiological change may be of the type of "making a note on," or may be merely "pleasure" or "discomfort." "Pleasure" and "displeasure" in things seen or heard, merely as seen or heard, is similar to the "pleasure" and "displeasure" "experienced" by the primitive animal organism, when a physical change occasions a physiological change. The musician avoids discords, the artist avoids—whatever artists do avoid—just as the amoeba avoids hot water. Their reactions are similarly determined; their "experience" is similar. Biologically, "seeing" and "hearing" are means. We make them ends, taking great pains to see or hear some new thing. The artist and the musician are visual and auditory epicures as the rest of us are gustatory epicures, when we dine, and not merely feed, when nourishment is incidental to the pleasure of eating.

I am aware that the distinction I have drawn between "conscious" and "unconscious" acts is quite valueless as a test for distinguishing given cases. There is an element of repetition, as well as of contingency, in every "conscious" act, and of contingency in every living act. I cannot say whether an individual performed a given act solely as repeating previous activity in similar circumstances, "mechanically," as we say, or whether there was an element of contingency in the act. I find it difficult to know whether I am myself, in the act of writing, acting repetitively or contingently. I am not attending as carefully as once I did to my up-strokes and down-strokes, to my spelling and punctuation, and so far my activity is repetitive. But even in regard to what I am writing, the choice of words and their arrangement, my activity is largely repetitive, or there is nothing in the saying, "The style is the man." In other words, so long as my pen goes on uniformly, I have no warrant for supposing that my activity is largely contingent, and not largely repetitive. I may have a very strong suspicion, but there is a story of a man who wrote what he thought was an original essay, or sermon, or something, and it wasn't. When my pen halts, on the other hand, or when I strike out a word and substitute another, there is a strong presumption that my action is what is called "fully conscious." So-called "voluntary" activity is best performed when the "attention" is not engaged. When a check occurs in our animal energizing, then is when we begin to "attend." The old aphorism, to which, allowing for terminological inexactitude, I entirely subscribe, "We are only conscious as we are conscious of change," applies not only to change in the external world and change in the body as physiological, but to change in the animal "voluntary" activities. "Voluntary" activity proceeding uniformly tends to drop out of "consciousness." It is when a check occurs that we become more "conscious."

But if my distinction of living activity into largely repetitive and less largely repetitive is a theoretical one not adapted to practical use, the same is true of the subjectivists' conscious, sub-conscious and unconscious activities. It was to be expected that the line would not be hard and fast. We are most conscious, cognitively, when we meet a strange object, conatively, when we are learning to do a new thing; in other words, when we are acting with the degree of freedom biologically open to us, when our action is in a measure contingent. I would remind you of my hypothetical first animal. It was a pure contingency that it changed the direction of its movement on the occurrence of a physiological change. A certain motile organism has been shown not to "react at all to changes of temperature. If a portion of the preparation containing them is heated, they continue to pass into this region just as before, though they may be at once killed by the heat."* Jennings is obviously thinking of "voluntary" reaction when he says they "do not react at all," for he notes a very definite physiological reaction. Had we been descended from this organism, we should have had no "thermal sense," and heat would have been "discovered" like electricity, not given direct in "experience." Evolution occurs through such contingencies and character is formed through them, the contingencies appearing to us as acts of choice. Luck, not grace, makes saints and sinners, and luck, like grace, can change us at any time from one to the other. The great difficulty is to know which is which.

This brings me naturally to Samuel Butler's ideas on evolution. Butler held strongly that the evolution of character was a matter of luck. At the same time he held equally strongly that the evolution of species was not. Given the alternative "Luck or Cunning" he decided emphatically for cunning, for Lamarck, and built up

* Jennings, H. S. : "Behaviour of the Lower Organisms," p. 37.

a theory of evolution in which "unconscious memory" played the lead. It is surely a little perverse to allow us to become men through the cunning of all our ancestors and then to leave the development of our individualities to the tender mercies of chance. And in any case it is an outrageous defiance of the principle of continuity. As regards the theory of "unconscious memory," some form of which has recently been put forward by Semon, it is very nearly, *mutatis mutandis*, my own; whatever plausibility it may have in Semon's presentation, and I understand it has a great deal, might probably be adduced in support of the principle of habit. "Memory" is the subjective side of "repetition in similar circumstances." A mnemonic theory of evolution is as near as a subjectivist can possibly come to the habit theory of evolution.

What is required is a little more natural piety in face of the facts. I accept the fact that living action tends to be repeated in similar circumstances "simply because it has occurred before." But because our presently admitted categories of thought do not allow of such causation as this, because the fact is "unexplainable," we invent a hypothetical mental process in order to explain it. Then we use in regard to our unexplainable mental process the natural piety, the simple faith, with which we ought to have accepted the facts. Professor Stout writes: "One necessary and omnipresent condition of the formation of habit is the tendency of any mental process with its connected movements to repeat itself, simply because it has occurred before—a tendency which grows stronger the more frequently the process recurs."* Unable to believe what he sees, namely, that living action tends to be repeated simply because it has occurred before, Prof. Stout believes in something he does not see, namely, "a mental process with its connected movements" which "tends to repeat

* "Analytic Psychology," I, p. 263.

itself simply because it has occurred before." But again, no doubt, the two alternatives, in the words of my logician reviewer, would "seem to be on the same level as regards objective validity."

My theory of life imports a new causal category into our conceptual framework of physical nature, namely, a kind of temporal causation. In life we have this temporal causation "demonstrated to us, and I fancy that, in discussing the behaviour of atoms and electrons, physicists are beginning to speculate on its possibly contingent character. The order of the inanimate world may be the order of habit, and the irreversibility of the universe the irreversibility of life.

The life of an animal organism, as physiological, is a series of events strictly comparable to the series which constitutes the life of a plant. But in the case of animals the series is interrupted from time to time by events of a different kind. The subjectivist characterises these latter as "mental." The distinctive characteristic I apply to them is that they are absolutely contingent in origin and relatively contingent subsequently. But it is part of my contention also that all living-activity, including physiological, is of this nature. I should say, therefore, that the events which, in an animal's living-process, interrupt the physiological series, are of a second order of contingency. The interruptions do not involve any discontinuity in the physiological series: so-called mental events are mediated throughout, in my submission and most subjectivists will agree, by physiological events. That is to say, the interruptions are of the type of wave-motion, the continuous line representing the physiological series and the apices of the waves the "stream of consciousness." Thus "experience" in general emerges in a manner analogous to that in which, physicists tell us, various particular experiences, *e.g.* light and sound, emerge. (On this view the possibility arises that the reason why so many physical theories take the form of wave-motion theories is that that is the form of the physicist's

own consciousness.) Thus certain organisms happened to react in the peculiarly animal manner on the occasion of a thermal change. Thenceforth there is introduced into the series of events which they are, a determinant of a second order of contingency. The emergence of man merely as explicitly believing what is not revealed to sense does not seem to me to involve a determinant of a third order of contingency. It is only when his living-process is affected by his beliefs that this can be said to be the case. It would be rash, and uncharitable, to deny him the name of man until this happens.

The fact that an imposing system of "knowledge" has been built up on the data of experience is no guarantee of the factuality of those data. What is really important to science, Professor Eddington tells us, is not our experience of the world as qualified, but our experience of it as varying quantitatively in ways we can measure with clock and scale. But it is superfluous to require "experience" of quantitative changes. We *are* clocks and scales, thermometers and cameras, not to mention, in some cases, weather-glasses. We actually register changes in physical conditions, though we find it simpler to say we are feeling warm than to say we are registering a thermal change.

I do *not* hold that, in Professor Broad's words on Behaviorism, "the characteristic of being a mind or being a mental process *reduces to* the fact that a certain kind of body is making certain overt movements or is undergoing certain internal physical changes." I hold that mentality is a "delusive characteristic" arising out of the relation animal-environment, and I have tried to show how we came to make the mistake. I am not a *person judging* that mentality is a delusive characteristic. I am an animal acting as if it were so. I recognise—or assume—a new kind of equilibrium as between organism and environment, which I call viable equilibrium. All living activity can be described as the tendency of living systems towards viable equilibrium,

but this is no more explanatory than to describe all physical action as the tendency of physical systems towards a state of equilibrium. This is the final cause in its last stage of attenuation, and is reminiscent of the description of evolution as the survival of the fittest to survive. The explanatory account is the one in terms of accident and repetition.

To Common Sense and Psychology I will admit that I see this table. I know what they mean. To philosophers I will deny that I see it. And with Professor Broad's book beside me—but not otherwise—I could give reasons for my denial more or less cogent according to which meaning of the seventeen (or eighteen) possible ones they might adopt. But my own reason is that I "believe" that some other kind of event is involved.

As for the Law of Parsimony, which I shall be accused of transgressing. I claim that my new kind of causation actually effects an economy. It is not additional to Mind, it is in place of it. And the assumption of Mind, big as it is, is not equal to the work demanded of it (it is doubtful if even seventeen philosophers are absolutely satisfied with its seventeen forms), and has to be supported, in some of its forms at least, when heredity, instinct, habit and memory come into question, by all that is most objectionable in my assumption, namely, the tendency of events to occur simply because they have occurred before—but in this case the events are mental events.



*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on November 29th, 1926, at 8 P.M.*

III.—SCIENTIFIC METHODOLOGY WITH SPECIAL REFERENCE TO ELECTRON THEORY.

By DOROTHY WRINCH.

It is very interesting to notice the fact that during the last few years Electron theory has come to be the focus of interest for Scientific Methodology. Before this the theory of Relativity dominated our attention. There had been no theory previously which provided comparable material, either for the purpose of illustrating the principles of scientific method or for actually pointing the way to a further development of scientific ideas. However, recent advances in Electron theory have been so considerable and of so far-reaching a character that the material it offers is very nearly, if not quite, as important as the material offered by the Relativity theory. An examination of the present position in the subject certainly offers great scope to the logician and the philosopher.

A great deal of the material to which I shall refer has been available for discussion for some few years, and, indeed, on at least one occasion the Society has directed attention to certain aspects of it.* There is, however, a special reason which has led me to this investigation at this particular time, for during the last six months a development has occurred which it is reasonable to think may prove to be of importance to Electron theory. Indeed, whatever may be its ultimate fate, it certainly provides interesting material for the illustration of the principles of scientific method. In this paper we shall not concern ourselves exclusively or even mainly with this new theory, which is as yet awaiting its thorough examination and discussion by professional

* "The Quantum Theory" in *Concepts of Continuity*, 1924.

physicists, but in the course of our investigation it will be worth while to direct the attention of the Society to its existence and to introduce those parts of it, which, whether they prove acceptable to the world of physics or not—and I cannot too strongly emphasize that the position with regard to the theory is at present entirely open—enable us to obtain some rough estimate of its value as a contribution to scientific theorizing.

There are a number of reasons why Electron theory has become of such vital importance to all those who are interested in the general fabric of scientific thought. A few years ago, when spectroscopy was at the beginning of its sensational development, there could not have been found a collection of data about the external world which presented a more hopeless spectacle. Spectroscopy consists of a vast number of facts relating to the wave-lengths of the radiation thrown off by atoms and molecules under various conditions. The "spectrum" belonging to one element is simply the set of lines representing the characteristic wave-lengths in its radiation. The spectrum belonging to some elements and parts of the spectra belonging to many others are pretty well known, and indeed there are in the case of many elements a number of different spectra characteristic of the element under different conditions of excitation. In the case of hydrogen, to take the simplest example, the spectrum under normal conditions of excitation has already been found to give a vast number of characteristic wave-lengths running into four figures, while iron gives at least five thousand characteristic wave-lengths, and with the increasing delicacy of observation which is to be seen in spectroscopic research year by year there will, no doubt, be an ever-increasing number available.

However, since the early days of spectroscopy, the whole status of the subject has changed. Instead of a hopeless array of

facts, whose significance was hidden by the very accuracy and the vast number of results, we now have a nucleus of important and obviously significant inductions. Spectrum analysis has indeed developed from being a catalogue of isolated brute facts about the universe into one of the most fundamental instruments in physical research.

The first important step was taken by Balmer, when he succeeded in putting a number of lines belonging to the arc spectrum of hydrogen into the form

$$n = N (1/m_1^2 - 1/m_2^2), \dots \dots \dots (1)$$

where N is constant and m_1 and m_2 are whole numbers. But this simple formula was only the beginning of sensational developments. Very soon large numbers of spectrum lines belonging to different elements were shown to fall under the more general Rydberg formula

$$n = N [1/(m_1 + t_1)^2 - 1/(m_2 + t_2)^2] \dots \dots \dots (2)$$

where N is the same constant. m_1 and m_2 are still whole numbers, and t_1 and t_2 are certain specific numbers varying from element to element. These attractively simple results, in a very short time, brought order into the chaos which had previously characterized spectroscopic research.

Furthermore, instead of the gradual piling up of huge numbers of new facts determined simply by what experiments happened to be the easiest to perform, a definite lead has been given to the development of the subject. Previously experiments were carried out merely because they were the most convenient from the point of view of laboratory resources, and huge numbers of new facts relating to wave-lengths were gradually established. But now theory to some extent at least determines the experiments to be carried out. Thus, for example, it had been known that so-called spark spectra exist when the conditions of discharge of electricity through the gas are intensified, but there had been no systematic knowledge of the way in which the characteristic spectra in the case of many elements are, under certain circum-

stances, replaced by the spark spectra. The new theories of spectra predicted that this should occur, and in particular that the Rydberg constant N should be replaced successively by

$$4N, 9N, \dots$$

forming entirely new spectral series. This supplied a clue to the arrangement and interpretation of such spectra which has been decisively confirmed by an examination of the data relating to spark spectra already existing, and has also stimulated the discovery of many other spark spectra.

On this important topic, therefore, theory gave a lead to experiment which made it possible for experimental spectroscopists to produce the data which are certainly of critical importance. Of course, it is undeniable that, in many cases, just those spectra for which the theoretical physicist is particularly waiting have proved most difficult to obtain, owing to some detail of laboratory technique or the properties of materials, such as, for example, the absorption of radiation by glass, which necessitates the use of quartz tubes in many spectroscopic researches. But the interesting and important point remains, that theory has in many cases been able to guide experiment, and this is of real significance from the point of view of scientific methodology.

It must be realized that the vast majority of facts about the external world are in themselves of very little, often of no importance whatever for scientific theory.

The occurrence of a particular phenomenon at a particular instant may mean almost nothing. Even the recurrence of similar phenomena at certain intervals may not be of any deep significance. For consider all the theories which are capable of accounting for sub-classes of the facts about the external world; only a very small minority of them contribute anything to the fabric of science. Thus, for example, a well-established induction about the reactions of children of a certain age to a certain stimulus

may contribute absolutely nothing to the development of psychological theory ; on the other hand, a single fact about the reaction of one child on some specific occasion may be the starting-point of advances of great significance and far-reaching importance. There is no democracy in the world of facts. Some are vitally important, but some are less than the dust. The number of them it is beyond our power to visualize. But unless there is some way of discovering which of the facts in any one domain are likely to be significant for science, experiment and observation may easily continue year in year out, without any significant advance in scientific theory resulting. It would, indeed, not be difficult to point to a number of domains of experimental practice where the situation is precisely this.

It is therefore the search for critical facts which should be the aim, not the search for the largest quantities of brute facts, irrespective of their probable significance for scientific theories. And it is for this reason that advances such as those to which we have been referring demand our attention. In demonstrating the applicability of the simple formulæ of (1) and (2) and of others only slightly more complicated, Balmer, Rydberg and Schuster* took the first steps in building up spectroscopic theory into its present highly important state of development.

It is particularly interesting to notice the colourless nature of a bare and isolated spectroscopic result, such as, for example, that under certain circumstances hydrogen radiates light, some of which has the wave-length $6563\cdot0$. Now it is scarcely conceivable that this particular number $6563\cdot0$ represents the wave-length in question with absolute accuracy. We cannot but imagine that more sensitive instruments would divulge further figures. We are therefore presumably in possession of the information that there is a specific wave-length which among unnumbered others is characteristic of radiation from hydrogen

* Cp. the Rydberg-Schuster law relating to the "Sharp" and "Principal" series belonging to the same element.

under certain circumstances, which differs by less than one part in ten thousand from 6563·0.

Now there is a sense in which we can call such a fact colourless—there can be no deep suggestiveness in such a fact; there is no “body” in it; there is no real substance behind it. In the old days certain numbers, such as the “Golden Mean,” when they occurred, were interpreted as having deep meaning in virtue of some mysterious intrinsic property which they possessed. But a mere arithmetic number occurring in isolation, which is itself not known exactly, but only to a certain degree of approximation, cannot reasonably be of deep significance.

If now we contrast the experimental result relating to a single wave-length characteristic of hydrogen with the theoretical formulæ referred to above, and especially with the suggestion that there is a universal constant N involved, as a direct multiplying factor, in the wave-lengths of radiation from all elements, then the real significance of the advance in spectroscopy will be apparent. Mere isolated arithmetic facts have been used to give probability of a very high order to a general theoretical result, which discovers the existence of a constant of nature which is of comparable importance with the other constants of nature whose existence has been practically established, constants such as e the electric charge on an electron, m the mass of an electron, and γ the constant of gravitation.

This remarkable change from a mass of uncorrelated facts to the existence of simple, important and comprehensive laws of arrangement of spectral lines is then the first reason for the great importance for methodology of modern electron theory.

We have already referred to a typical fact yielded by experimental spectroscopy, namely, that under certain circumstances hydrogen radiates among others the wave-length 6563·0. Any one example is quite sufficient to enable us to appreciate the

extraordinary degree of accuracy to which spectroscopy has attained in the hands of Fowler and others. The development of delicate spectroscopic instruments is indeed one of the triumphs of modern experimental science.

As another typical fact we may cite the red line $7067 \cdot 123$, the leading line in the sharp series of helium, given by Eversheim. This wave-length, which is measured in Angstrom units, represents a length of about 7 hundred thousandths of a centimetre. The experimental result, therefore, specifies that there is light radiation from helium, whose wave-length differs from $7,067,123$ hundred thousand millionths of a centimetre by not more than about one part in ten million. This degree of accuracy is stupendous. Apart from spectroscopy, the high-water mark of accuracy in physics is shown in the determination, for example, of the velocity of light, which is still only known with complete accuracy to one part in a thousand.

Now from the point of view of scientific method this high degree of accuracy is of great importance. Only a few years ago we were appreciating that there were three critical facts for Einstein's new theories, namely, the rotation of the apse line of the orbit of mercury, the bending of light in the neighbourhood of the sun, and the shift of the lines in the solar spectrum towards the red. And it was an important factor in the high degree of probability which professional scientists have given to the theory of Relativity that these numerical data were available to such a high degree of accuracy. It is still a very stimulating fact that such a small rate of advance as 43 seconds of arc in a century in the perihelion of mercury should have proved to be a critical test at that time for the vast theory of Relativity. Of course, the importance of this isolated fact is already receding into the background. It was vital in the actual process of discovery, as it happened to occur in the time series; but Relativity has now, in the minds of most people, taken up an almost unassailable position in the fabric of science, a position to which it is entitled on the

general grounds that from certain hypotheses of a very general nature it has developed a structural theory about the external world which covers and correlates immense numbers of facts established beyond all reasonable doubt by means of inductions from experiment and observation.

In the same way, the fact that the practical spectroscopists are able to supply the theoretical physicists with data to such an amazing degree of accuracy is likely to have yet more far-reaching consequences; for in the case of a science which has already reached the stage in which theory is pointing the way to experiment, it is upon the verification of hitherto unobserved facts which the theory has predicted that it depends for its probability. Of all the sciences, I think it may reasonably be said that spectroscopy is in the strongest position in this respect. The degree of accuracy to which the predictions of theory can be tested is beyond anything that has been seen in any other experimental science.

We have referred to the spectroscopic constant N as being of comparable importance with constants of nature, such as e and m . But the really interesting question for methodology is the logical status of N . Is it a new independent constant of nature, or is it merely compounded of constants of nature already well recognized to be fundamental? Spectroscopists have shown conclusively, for all practical purposes, that N involves the well-known constants, m the mass of an electron, e the amount of its negative electric charge, c the velocity of light, and, in addition, a constant h , which has already been proved to be a great significance in other branches of physics, as, for example, in Planck's theory of black body radiation. In fact, it is established that

$$N = \frac{2\pi^2 mc^4}{ch^3}$$

Our attention is therefore directed to this proposed constant of nature h .

It is not necessary now to discuss the nature of h , the "quan-

turn of action." It was debated before this Society in a symposium in 1924. It is sufficient to say that h is a constant having the dimensions of action, and that in terms of it and the other constants of nature we are able to describe in theoretical terms large domains in physics, such, for example, as photo-electricity. By means of this constant h , whose value is known to a very high degree of accuracy, simple laws have been formulated which cover vast numbers of facts which previously were unrelated to scientific theory. It is therefore quite undeniable that h has some very deep significance in the world of physics.

Our concern is, however, with the question of the logical status of h , not with its importance in physics. Is it a logically primitive constant, or is it merely covering for the moment the existence of some other more fundamental constant? Can h be derived from some characteristic of the electron which has logically the same kind of status as the mass of an electron or its electric charge?

Here we come upon a question which is of far greater difficulty than almost any other which we encounter in examining methodologically the present position in theoretical physics. It will be my object to define the points of view which may reasonably be taken on this issue, but not to adopt a specific point of view as the one most likely to be correct. As logicians, we are happily not called upon to decide between the different positions which may be taken up. It is our business merely to apply methodological principles.

Now, in the first place, we can assert that, in spite of the enormous success which has attended the introduction of h , we have no right whatever to say that theoretical physics requires the introduction of h . This point is of interest only to logicians, and the instinct of a physicist on encountering it would probably be to misunderstand it and, misunderstanding it, to deny it hotly.

We are NOT denying that it is highly probable that there are experimental facts corresponding to all the many and various formulæ which involve h , which are current in modern physics. The great success of these formulæ is well known to everyone who has any acquaintance with the subject. The probability of other facts already predicted by them being found, when laboratory conditions allow, it would be reasonable to estimate to be very nearly unity. What we are asserting is that there may be other theoretical bases for such groups of facts. And such a proposition no reasonable person is in a position to deny. There may be alternative bases which for other reasons of a methodological nature are preferable.

It will be enough merely to register the fact that there is no logical reason for denying such a possibility. We shall not attempt to elaborate particular examples of such a point of view, nor should we dream of advancing arguments in favour of any one rather than any other. The introduction of the constant h is sufficient to account for tremendous numbers of well-established scientific facts. No one, however, has any right to assert that the introduction of h is necessary. These are our two conclusions as logicians.

Before we leave this question of the logical status of the quantum of action h , it will be worth while to consider how far the assertion that a certain concept is or is not logically primitive, affects our views of its importance and general prestige.

Suppose that in the case of a science such as bio-chemistry we are discussing the logical status of any one of the concepts upon which its theoretical development is founded. We shall perhaps come to the conclusion with respect to a particular one of these that it is logically derivative, in a comprehensive picture of scientific theory, from certain other concepts belonging

to chemistry, even possibly from certain concepts belonging to physics. Indeed, it is a not absurd view to hold that all its concepts can be derived by the process of logical construction alone from more fundamental concepts which belong to other sciences and, indeed, to hold that there is a hierarchy of the sciences, according to which each science can construct the ideas with which it is specially concerned out of material belonging to some more fundamental science, until every single concept, whatever the science may be in which it occurs as a central idea, can trace its logical ancestry through a number of others back to the fundamental ideas which form the logical basis of science as a whole. On this view the division into different sciences will be largely a matter of convenience. It will perhaps prove advantageous to isolate the class of phenomena which are subsumable under one combination of concepts and call it anthropology, to isolate out another set and call it bio-physics, to isolate another and call it abnormal psychology, and so on.

Now suppose that there is a concept such as, for example, the concept of the Unconscious, which appears to correlate together large numbers of facts previously unrelated and to be fruitful in suggesting further experimental researches. It will not in the least detract from the importance of the concept if it is found that there is a long and complicated logical ancestry behind the concept. Its prestige will be no less great than if it appears suddenly on the horizon and remains for evermore unrelated to other concepts which have already proved fruitful in dealing with other classes of facts. The position is rather the contrary. If a particular concept can be shown to be logically derivable from others which already have the support of a vast body of other facts, its validity may properly be considered to be enhanced.

The situation with respect to the quantum of action h appears to be very similar. If h is not logically primitive, its prestige is not in the least prejudiced. There is no need, therefore, for those who are tremendously impressed by the achievements of the

quantum h to take sides at all on this point of its logical status. Whatever may be the judgment of professional physicists and logicians, it still remains true that the introduction of the quantum h as an important physical constant has made possible advances of the greatest consequence. It was first of all important in statistical physics. Until Planck introduced it at the end of the nineteenth century there was no scientific theory of thermodynamics, whereas nowadays the theory of black body radiation and Debye's theory of the specific heats of solids at very low temperatures have proved to be of the greatest importance for physics. Then it was found that this very same constant was quite fundamental in the entirely different domain of physics dealing with photo-electricity. Finally, in Bohr's theory the constant h appeared again. Thus the quantum of action has proved relevant in the description of phenomena of the most varied kinds. In particular it is significant of its wide validity that it is a key constant both in microscopic phenomena, such as emission spectra and in macroscopic phenomena with which statistical physics such as black body radiation is concerned.

But in spite of the fact that for present-day physics h is undeniably a key constant, we may now consider the possibility of h being logically derivative. And it is at this point that the new development already referred to becomes relevant.

L. V. King, in two short papers* published by the McGill University in the summer of this year, has propounded a theory in which h is derived logically from a constant belonging to the electron. He assumes that electrons possess a characteristic spin of a certain specific magnitude, and it is in terms of this spin that he obtains the constant h . In this way he is able to take over at once large parts of modern physical theory which depend

* Gyromagnetic Electrons and a Classical Theory of Atomic Structure and Radiation. (At the Mercury Press, Montreal.)

essentially—so far as we can see at present—on h . This is manifestly a tremendous recommendation for the theory. For, as we have already pointed out, it is clear that vast inductions can be covered admirably by various formulæ involving h . All this remains on the new theory, and the high degree of probability given to those formulæ, consequent upon their very remarkable success in correlating known facts and in predicting others which were subsequently verified experimentally, lends great plausibility to this new theory, which gives h as an important constant in physics, logically derivative, however, from the characteristic velocity of spin of an electron, just as it lends great plausibility to the current theories which introduce h as a new logically primitive constant. So far as these formulæ are concerned the new theory and the current theories share the same high degree of probability.

Although it is too soon to have an opinion about the new theory of spinning electrons, we must, for reasons already given, take the view that none of the successes which have fallen to the lot of quantum physics in the past, stupendous as they are, offer an *a priori* reason for thinking that h is a logically primitive constant of nature. If it can be defined in terms of other more fundamental constants by means of theories which prove to be successful in domains not covered by quantum physics, great advances may be possible by means of theories which take away from h the character which in the minds of many physicists it seems to have, namely, the character of being a primitive constant of nature indefinable in terms of the ordinary dynamical characteristics of electrons which were the subject of fruitful research and study in the days before quantum physics was introduced. It may be the case that the existence of the constant h in so many formulæ of physics can be explained in terms of electrons moving in certain well-defined manners according to the well-established laws of the electromagnetic theory.

It must be remembered that the earlier successes of electron

theory flowed easily and unambiguously from [Maxwell's Electro-magnetic equations. The well-established ratio of the masses of an electron and a nucleus

$$m/M = 1/1835$$

was one of the earliest, and there are numerous others. And correspondingly we must also remember that the formulæ involving h upon which quantum physics entirely depends involve the denial of certain consequences of the classical electromagnetic theory. Notably, there is the proposition of the classical theory that, except when it is moving in a straight line with uniform velocity, an electron always radiates energy when in motion, and the denial of this proposition in quantum physics.

There are, therefore, very important issues at stake. If a theory is found which allows the propositions involving h upon which quantum physics prides itself, without having to deny consequences of the classical theory of the motion of electrons, it will be in a very strong position. The propositions of quantum physics would remain as part of the structure of science, in form at least. But there would be a new methodological status for h , which, though very important from the new point of view, would no longer be interpreted at the cost of denying the applicability of classical electromagnetic theory. In view of the fact that the classical theory has built up the most beautiful of sciences in the domain of optics, in the whole domain of radiation from the longest "wireless" waves, through radiant heat and visible light, down to the ultra-violet, we can easily see how great an advance would be implied by the advent of a new theory of the kind described.

In view of the great importance which would belong to any theory which accomplished the derivation of the quantum from classical electromagnetics, it is worth while to describe the general features of the theory of spinning electrons in outline. This I shall now endeavour to do, confining the description of it

to those features which are capable of explanation in simple terms.

It is assumed that an electron possesses at all times a characteristic spin. This particular velocity of spin, it is suggested, is a constant of nature, which is to be accepted just in the same way as m the mass of an electron at rest, and e the amount of negative electricity which it carries. This suggestion of course provokes a pleasant feeling of homogeneity; *a priori* it is as reasonable to accept without demur a characteristic spin, if the electron is spinning at all, as it is to accept a characteristic mass and electric charge for any electron.

The suggestion that electrons rotate is far from being entirely novel. It was suggested in 1908 by Ritz and later by Lorentz and others, but little progress was made. Now, however, King has worked out the consequences of using the theory of Relativity in working out the contraction suffered by an electron while in motion, and has combined them with the hypothesis of rotation at a constant rate which is to be characteristic of all electrons whatsoever.

Now, when a body is rotating and at the same time moving with a constant translational velocity, if it is slightly disturbed, it sets up a precessional oscillation of a definite frequency which it is easy to work out in terms of the velocities. In the same way a body, in any state of rest or steady motion, if disturbed, describes oscillations which have a perfectly definite frequency. Thus a bob hanging freely at the end of a string, if it is disturbed, executes periodic vibrations which depend by means of a simple formula on the length of the string: upon this principle depends the keeping of time by means of a pendulum.

It is therefore upon a very simple and yet fundamental piece of dynamics that the first proposition in the theory depends. The frequency of the precessional oscillation of an electron is determinate if the characteristic angular velocity of spin and the translational velocity are given, and since an oscillating magnet

can radiate electromagnetic waves, the oscillating electron moving with a specific translational velocity which can easily be shown to behave like a magnetic doublet, can throw out radiation due to its precessional oscillations of a perfectly definite frequency ν given by the equation

$$k\nu = \frac{1}{2}mv^2,$$

where k is a constant depending upon the characteristic spin. And in this account we are to understand radiation in the classical sense. No *ad hoc* assumption as to its nature is required.

It is, then, an easy matter to derive the well-known photo-electric equation

$$h\nu = \frac{1}{2}mv^2 + P,$$

where P represents the work done in withdrawing an electron from the controlling force of an atomic nucleus, if we merely interpret k as the quantum constant h . This equation is well known to be correct not only in the ultra-violet but also for much of the X-ray and γ -ray spectrum.

Thus, apparently, the theory is able to take over and explain on classical principles the vast subject of photo-electricity, which, previously, was thought to involve the *ad hoc* assumption of the quantum h associated with a "frequency" for which the quantum theory provided no physical interpretation whatsoever. And this state of affairs has been brought about at the cost of assuming for all electrons a characteristic rate of spin.

We have pointed out that the present result has been obtained only by taking into account the findings of the theory of relativity. For, when a body is in motion, it contracts, according to relativity theory, in the direction of motion. This deformed electron has proved to be successful where the undeformed electron, which would have been treated in pre-relativity days, would necessarily fail.

The new theory therefore offers an interesting illustration of a state of affairs which is very often encountered by the student of scientific methodology. For here we have two well-established bodies of theory, on the one hand classical electromagnetic theory, and on the other Relativity, and the success of a suggested piece of scientific theorizing depending on one, is due to the introduction of modifications required by the other. At the present moment, when the spinning electron is only at the very beginning of its trial as a basis for atomic physics, the fact that the Relativity correction is necessarily introduced if the theory is to do what is required of it, is merely a piece of deduction on the usual lines, in which relativity is taken to be an already established piece of the fabric of science and the spinning electron a new and comparatively untried suggestion. But in the event of the spinning electron becoming, as it may, a recognised part and indeed a fundamental part of electron theory, we should have an interesting illustration of various theories--on this occasion two only--being built up gradually from their successes in covering inductions from experience in various domains, and at the same time, by their inter-relations, each in turn adding to the probability of the others. This backwards and forwards tendency in science, whereby first one and then another theory is taken as fundamental, and the successes of each in turn may be used owing to their inter-relations, as data which add to the ever-increasing validity of the other, is typical of the structure of science. It suggests unmistakably that there is in some sense a fundamental unity in the laws governing the external world.

The other aspect of the theory on which I wish to touch relates to the formulæ for the emission spectra associated with various types of atoms which have already been discussed.

Suppose that a rotating electron is proceeding on a circular orbit under the attraction of a nucleus which is also rotating. Then, owing to the magnetic field, there will be disturbing forces

on the rotating electron. Now the electron will, as explained previously, execute precessional oscillations and, in consequence, throw out electromagnetic radiation whose wave-length depends upon the velocity of the electron in its orbit. According to the ordinary principles of orbital dynamics we are able to work out the velocity in terms of the dimensions of the orbit when the magnitude of the attracting force is known. Here, therefore, since the orbit is being described simply under the electrostatic attraction of the nucleus, which, as usual, bears a positive electric charge, corresponding to any radius of the circular orbit, there will be a corresponding velocity in the orbit and consequently a corresponding frequency for the precessional oscillation of the rotating electron. The intensity of the electromagnetic radiation whose wave-length is hereby determined as a simple function of the radius of the orbit, is, however, only specially great when the precessional frequencies are in resonance with the fundamental tone or the overtones of the small oscillations about steady motion in the circular orbit in question, for upon these depend the disturbing forces which themselves provoke the precessional oscillations which, in their turn, cause the electromagnetic radiation. Thus we obtain a set of circular orbits in which there is severe radiation. The radii of these orbits are in the ratio of the squares of the natural numbers. We get emission spectra which fall under the formula

$$n = N (1/m^2),$$

where m is a whole number and N a constant.

A further application of the principle of resonance allows the deduction of the actual formulæ

$$n = N (1/m_1^2 \pm 1/m),$$

which, of course, include the fundamental formula of spectroscopy and involves the general spectroscopic constant N , which is in the usual way compounded out of the constants m , e and h . This very remarkable deduction is made merely by means of well-

known principles of dynamics and electromagnetics without any of the assumptions as to the non-radiating states of atoms upon which previous theories of emission spectra depend, assumptions which, it will be remembered, seriously conflict with well-established classical theory. Thus the new theory has arrived at the same formulæ and, indeed, at further developments of them, which have still to be verified, yet without certain disadvantages which previous theories certainly possessed. The fact that its formulæ in some cases even go beyond these gives a further lead to experimental research.

There is therefore some reason to feel that in the idea of the spinning electron we have a new point of view which may very well prove to be fruitful. It certainly stands a chance of being an important contribution to the structure of science, since it has the characteristic which all important theories must necessarily possess, of giving a lead to experiment. But at present it is too early to obtain information as to its success in those of its predictions, which go beyond the predictions of electron theory as it at present stands. Our concern is merely with the consideration of the spinning electron as a suggested piece of scientific theory. We have endeavoured to give, in the shortest possible space and in the most general possible terms, an outline of the first draft of the theory. In doing this our object has been to point out the general characteristics of it from the point of view of methodology. Whether it turns out to be acceptable when it has been comprehensively tested and investigated by those [best fitted to judge it, only the future will show.

It has proved impossible in this short paper to give even an outline of all the ways in which electron theory is relevant in its present state to the subject of scientific methodology. But it is

of real importance that those who are interested in the application of general principles to theories about the Universe should realise how much material present-day physics has to offer. Since the coming of Relativity the whole aspect of the subject has changed. The new theories have opened our eyes to new principles and to new ways of applying principles already known.

But there is also another point of view which is relevant to our investigation. The theories of science gradually become part of the structure of science, but, before they do, it is of the utmost importance that they should be subjected to the fiercest possible criticism. In the case of many of the technical questions which every theory raises, this is best undertaken by the professional scientific worker. But there are generally some questions which are best criticized by logicians and philosophers whose concern is at least partly with questions of structure and logical form, and this is especially the case when radically new ideas are involved. The logical status of the quantum of action is essentially a question of this kind. Hence, in addition to gleaning all that can be gleaned as to the application of general principles to the systematic description of the external world, it is the task of the student of scientific method to bring forward every possible criticism of ideas newly introduced into science and to emphasize all the points of view which are logically possible. In this paper we have endeavoured to indicate how much can be asserted about the status of the quantum of action, for in view of the new developments acute controversy on this point is almost certain to arise in the near future. But this is only one of the questions which are awaiting treatment at the hands of students of methodology. The other problems I commend to the earnest attention of all those whose concern is with the critical assessment of the progress of scientific thought.

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W.C. 1, on December 13th, 1926, at 8 p.m.*

IV.—THE KNOWER AND THE KNOWN.

By JOHN ANDERSON.

WE are accustomed to think of Realism and Idealism as conflicting views about knowledge. In this paper I shall be concerned partly to bring forward arguments in support of the realist view of knowledge, but even more to indicate what I take to be important consequences, in regard not only to mind and knowledge but to philosophy in general, of accepting that position. While it may be conceded to Professor Montague that "the point at issue between realism and idealism should not be confused with the < point > at issue between empiricism and rationalism,"* in that the former has specially to do with knowledge while the latter has not, there are reasons, which I think conclusive, for holding that a realist can only be an empiricist. The question of the nature of relations is at any rate one issue between rationalists and empiricists, and, as the authors of "The New Realism" have shown, the basis of a realistic theory of knowledge can only be a certain theory of relations; which enables us to draw definite conclusions from the contention that knowledge is a relation. Thus, according to Professor Montague, "Realism holds that things known may continue to exist unaltered when they are not known, or that things may pass in and out of the cognitive relation without prejudice to their reality, or that the existence of a thing is not correlated with or dependent upon the fact that anybody experi-

* *Program and First Platform of Six Realists; The New Realism, Appendix, pp. 473-4.*

ences it, perceives it, conceives it, or is in any way aware of it.”* And Professor Marvin makes the theory of relations here indicated still more explicit. “In the proposition ‘the term a is in the relation R to the term b ,’ aR in no degree constitutes b , nor does Rb constitute a , nor does R constitute either a or b .”* Knowledge being taken as a relation, it is thus asserted that, when I know this paper, “I know” in no way constitutes this paper, nor does “know this paper” in any way constitute me, nor does “know” in any way constitute either me or this paper.

The view that knowledge is a relation implies that knower and known are two different things or that, in knowledge, the knower is not the known. It is indeed admitted on any view that there is a distinction between them, and if knowledge were not then called a relation, it would only be because relations were held to be comparatively unreal: but those who would say this would say the same about distinctions. The realist is thus found to be maintaining that distinctions are absolutely real. According to the opposing view, distinctions are “distinctions within identities,” and any relation is a “form of identity.” If a thing is *really* related in a certain way, the relation in question belongs to its “nature,” and since that to which it is related is thus not essentially separate from it, a certain “identity of nature” holds between the two. But this theory of natures or essences is precisely rationalism, and the realist, in denying that aRb asserts or implies any identity between a and b , is taking up an empiricist position.

He does not, of course, deny that there is a certain “identity” in the case, viz., the identity of aRb as a given situation or state of affairs. When it is argued that the distinction between subject and object must be “a distinction within an identity,”

* *Program and First Platform of Six Realists; The New Realism*, Appendix, pp. 473 4.

the reason alleged is that there is no subject without an object and no object without a subject. But this merely means that any "subject-object" relation has two terms; it could not for a moment show that knower and known are not two different things, or that anything is to be regarded as *in itself* either a subject or an object. Hume points out that the facts that it takes a man to be a husband and that every husband has a wife do not imply that every man has a wife; similarly, to assert that it takes a mind to know or a thing to be known does not imply that every mind knows or every thing is known. But of more importance here is the fact that while we speak of a certain marriage, and agree that there is no husband without a wife and no wife without a husband, we find husband and wife in any marriage to be two different persons. The one *is not* the other. Those who argue that knower and known are in some way identical because they are in *a certain* relation, have also to maintain that any two different things are in some way identical, since any difference is a certain difference or since "A is different from B" is a certain state of affairs. So that when we say that A is not B, we are somehow also saying that A is B and B is A. On this basis discourse would be impossible.

It is thus seen to be logically necessary to hold that, in knowledge, "the knower is not the known." It follows that to tell us *what a man knows* is not to give a description of that man (to state some character or quality which he has), any more than to tell us *who knows it* is to give a description of a thing. The fact that a man does know certain things may enable us to infer that he is a man of a certain character, but this inference would not be possible unless we had previously come to believe that only persons of that character knew these things, *i.e.*, unless we had had previous opportunities of observing that character independently. But again, since knowledge is a relation, to tell us *that a man knows* is not to give a description of

him, any more than to say *that a thing is known* is to say what sort of thing it is. We may believe that only beings of a certain sort do know, but that depends on our having recognized their character independently of their knowing. And, in general, in saying of any two related things that they are distinct, we must suppose each to have some character, or certain qualities, of its own. We must distinguish complete statements like "X is a man" from incomplete statements like "X is a husband." The latter is, of course, used roughly to convey the fact that X has those characteristics which will be found in the first term whenever there is a true statement of the form "X is the husband of Y." But those characteristics are understood to be discoverable by observing X alone, while we could not in that way find out what was meant by his being a husband.

Arguing then, as realists, that no thing or quality of a thing is constituted by the thing's relations, we have to assert that nothing is constituted by knowing and nothing by being known. The notion of "that whose nature it is to know" is expressed in the term "consciousness"; the notion of "that whose nature it is to be known" in the term "idea." Realism is therefore concerned to reject these terms, as involving the attempt to take relations as qualities. If the term "conscious being" merely meant that sort of thing which can know, and "idea" that which can be known, they might be used in incomplete statements similar to "X is a husband." But we must have some notion of what sorts of things these are, since we could never have supposed that nothing knew something or something knew nothing. Thus we must know what sort of thing a mind is, independently of terms like "consciousness" or "state of consciousness"; and we must be able to describe things independently of their being known or of their being known in some particular way, so that "sensa," for example, cannot be a proper name for any species of things. A strictly

realist theory must dispense with all expressions of these sorts, in order to be consistent with its empirical starting-point and logical basis.

I.

(a) The theory of "ideas" as entities "whose nature it is to be known" (or which are "essentially known") is most explicitly formulated by Berkeley. To think of what is known as having a nature independent of its being known is, he says, to be guilty of "abstraction." This error consists in thinking separately of things which cannot exist separately. Thus we cannot truly know any object without knowing "all about" it (its "whole nature"); for if we only knew something about it, we should be separating that something from other somethings which in fact are also about it. In terms of this theory, if a thing really is known, we cannot think of it otherwise than as known, or we should not be thinking of *it*. "Can there," asks Berkeley, "be a nicer strain of abstraction than to distinguish the existence of sensible objects from their being perceived, so as to conceive them existing unperceived?"

It is, of course, impossible to maintain a view of this kind consistently, since strictly in accordance with it we could make no statements at all. That Berkeley does not do is shown when he says, "It is not in my power to frame an idea of a body extended and moved, but I must withal give it some colour or other sensible quality." He really ought to maintain, in the case of a coloured body which is extended and moved, that its being coloured and its being extended and its being moved and its being a body all mean precisely the same thing; in which case his argument is stultified. But otherwise he is admitting that we can conceive the thing as having any one of these characters, that we can truly assert something about it without saying "all about" it. He does in fact admit that, though it may be true

of an object A that it is given to us by God as a sign of B, we can know A without knowing this fact. It may equally well be that we may know a thing which is known, without knowing that it is known. There is no reason for denying this, if its being known is only *something* about it. And the alternative, which Berkeley would have to follow, is that, since we can only conceive separately what may exist separately, the separate statement that a thing is known implies that nothing else can be said of it but that it is known. There could not then be a number of different known things; there would simply be the essence "known." Indeed, since what I know must be "known by me" and there is nothing else that it must be, all that I can ever know is the single essence "known by me."

The only sort of assertion that we could make in starting from such an essence as "known" would be the identity "The known is known": and only by means of abstraction (passing from a whole nature to a supposed part of it) could any consequences appear to follow from such a statement. Now Berkeley does start from an identity, stated negatively, viz., "What is perceived cannot be unperceived"; which is merely an expression of the essence "perceived." But he proceeds from this, as the first quotation shows, to draw the conclusion that what is perceived cannot be *conceived to be unperceived*. Now the only guarantee of this conclusion is the fact that the thing *is* perceived; and if this is a guarantee, it must be because the thing is perceived to be perceived. (Here the notion of "idea" emerges, in the form of the "percept"; the conceiving of "concepts" and the sensing of "sensa" are suppositions of the same type.) What is perceived to be perceived cannot be taken (there is no special force in "conceived" here) to be unperceived. The obtaining of the given conclusion from the identity thus depends on the substitution of "perceived to be perceived" for "perceived." And the plausibility of the conclusion itself

depends on ambiguity ; it is plausible as meaning that we cannot conceive or suppose that " what is perceived is unperceived," but not in the required sense that things which are perceived cannot be supposed not to be perceived and must be supposed to be perceived. This cannot be admitted, since the various things that are said to be perceived cannot have their whole nature constituted by being perceived.

The fact, then, that we can make such statements as that red, or something red, is perceived, is sufficient to dispose of Berkeley's theory that what is known must be known as known. It would, on the contrary, be true to say that we know things as independent of being known, since we can only know them as existing and having characters of their own. Berkeley's theory, it should be noted, is not dependent on the use of the term " perception " ; it could be maintained in exactly the same way that " whatever is apprehended cannot be unapprehended," without any reference to modes of apprehension. So that his criticism of Locke, who had first admitted the " essentially apprehended " and then presumed a further knowledge of independent things, is quite sound. The criticism applicable to both is that we never know " ideas," but always independent things.

(b) Descartes's demonstration that there is something " whose nature it is to know," or, as he puts it, " whose whole essence consists in thinking," (*i.e.*, " consciousness ") proceeds in a similar fashion to Berkeley's substantiation of " ideas " : in fact, it may be said that Berkeley has simply applied to the known the principle of Descartes's argument about the knower. The latter is complicated by the fact that what guarantees the essential knowingness of a knower is the knower himself : but the same mechanism of essence, identity and ambiguity can be discerned. The assumption is that we cannot suppose ourselves, in knowing, not to know, *i.e.*, we cannot suppose that when we know, we do

not know ; but it is employed as if it meant that we cannot, in knowing, suppose ourselves not to know. Or, putting the argument positively, we must suppose ourselves, in knowing, to know ; hence we must, in knowing, suppose ourselves to know (or, in thinking, think that we think). By means of identity and ambiguity, therefore, Descartes arrives at the conclusion that we always know ourselves as knowing, and never know ourselves as anything else ; because we *can* suppose ourselves, though knowing, not to have that other character. The method, once more, is that what can be conceived separately from a certain thing is not of its essence but is a different thing, while what cannot be conceived separately *is* of its essence. And the strict consequence would be that no positive (non-identical) assertion could be made, since we could only make it by specifying a distinct part of a " whole nature."

The view that in knowing we know ourselves knowing, that we know as knowing or consciously know, is thus seen to be as ill-founded as the view that we know things as known. The identity " the known is known " does not imply that it is the same thing to know X and to know that X is known ; nor does the identity " I know what I know " imply that I must know *that I know it*, or know anything about myself at all, in knowing it. Descartes, having taken his knowledge as a subject to be considered, cannot in the same argument doubt that he knows : but a man who knows need not have taken up this position, and might quite well doubt that he knew, or that he doubted, or that there was such a being as himself. The conclusion that a person could not know without knowing his knowing, as we have seen, depends on ambiguity, and the conclusion that he could not know *himself* without knowing his knowing depends on the assumption that he must know " all about " anything he knows. This theory being logically untenable, there is no ground whatever for supposing that we must know minds as " conscious " or for

treating their knowing otherwise than as a relation to other things which is not part of their own "character." We have no more right to talk of a "conscious state" than of an "on state" or an "above state." And we may take it as possible that anything which knows may at another time not know, just as things which are known may at another time not be known.

It is not in the least implied that minds are not known, but only that they are to be known as having certain qualities. "The knower is not the known" has sometimes been taken to mean that the knower is not known; hence the doctrine of the transcendental ego. Alternatively, the distinction is taken to imply that the knower can only be known as knowing, *i.e.*, known *in a different way* from things which are known as known. But all that is implied is that the relation has order; it is not asymmetrical, but at least it is "non-symmetrical." When A knows B, B need not know A; and even if B does know A, this is a different state of affairs from A knowing B. Just as, in the relation of parenthood, "the parent is not the child" and yet is always the child of someone else, so, when I know a thing, someone else may know me and he may know my *knowing the thing*. Only if there are cases of this kind can it be possible for us to talk about "knowledge." But the person's knowledge of my relation to the thing is distinct from his knowledge of my qualities.

As regards my knowledge of myself, this will have to be accounted for by saying that a certain process in my mind knows another, or knows myself, but without knowing *itself*. We can only know ourselves, in fact, as certain very familiar *objects*. And if it is urged that the process which knows does nevertheless belong to myself, the answer must be that what we know consists not of things simply but of states of affairs (or propositions). Suppose, then, that I know that I am angry, the "object" may be roughly expressed by saying that within a certain contour

anger is occurring ; and the fact that the process which knows it also occurs within the contour is not to the purpose, since we do not require to know "all" that occurs within the contour. That which knows a given occurrence is a different occurrence ; it is not my anger which knows my anger. Detailed discussion of how we come to use the term "I" would be out of place here. It is enough to point out that on the realist theory the conception of a mind as a "unity" or indivisible whole cannot be sustained ; according to that conception neither I nor anyone else could know *anything about* my mind.

II.

According to realism, I have argued, we never know "ideas" but always independent things, or rather states of affairs. It seems to me to follow that such expressions as appearances or data, and as concepts, percepts or *sensa* have no place in realist theory. If, *e.g.*, there is a peculiar way of knowing called "sensing," it will only be on the assumption that relations somehow constitute their terms that we can use the term "*sensa*" to describe a class of things or a way of being. If, on the other hand, any class of things can properly be described as "*sensa*," to speak of knowing them as "sensing" is to make the same sort of assumption, and is no more justifiable than to speak of knowing trees as "treeing." I should maintain that there is no such thing as either sensing or *sensa*, since "the *sensa* which I sense" are taken to be those things, my knowing which depends on where and how I am, and since this (*a*) does not describe the things, (*b*) is true of all my knowing.

For Berkeley the things we know are "essentially related to our minds" and thus have a "relative existence," as our ideas. The theory of *sensa* is likewise a theory of "relative

existence," in someone's or some "sense-field," and of "that whose nature it is to have certain relations." Dr. Broad's theory, in this connection, does not, I think, differ greatly from other theories of *sensa*. *Sensa* are shown to be private and non-physical because of their *dependence* on certain conditions. Dr. Broad does not commit himself to the view that *sensa* are mind-dependent. "The facts are on the whole much better explained by supposing that the *sensa* which a man senses are partly dependent on the position, internal states and structure of his body." But certain examples, though they "do not suggest for a moment that *sensa* are existentially mind-dependent . . . do strongly suggest that they are to some extent qualitatively mind-dependent."* Now dependence is presumably a relation, and if a certain existence or a certain quality depends on something, this does not justify us, rejecting as we do the theory of constitutive relations, in describing it as a "dependent existence" or a "dependent quality." The existence or quality, though it might not have been but for that other thing, is independent in the sense of being distinct and having a character of its own. If Dr. Broad's explanations were correct, we should have to say that a certain thing now exists because my body was in a certain position, etc., and has certain qualities because my mind was in a certain condition. Granted all that, the thing now exists and has these qualities, and no reason has been shown for calling it private or non-physical.

Whether the explanations should be accepted is made exceedingly doubtful by noting the ambiguity of the statement that "the *sensa* which a man senses" are dependent on his body. This may merely mean that what is dependent is "the fact that he senses these *sensa*," i.e., his sensing them, i.e., his standing in a certain relation to them. That this should be

* *Scientific Thought*, pp. 259 and 261.

dependent on where he is could occasion no surprise to common-sense, and would justify no statement about the dependence of the "sensa" themselves. The fundamental criticism is, however, that what exists because of me nonetheless *exists*, apart from or independently of me. The houses which would not have existed, had not men planned and built them (*i.e.*, but for their minds and bodies), are physical and are not private to these men; they stand for other men to see them and may remain when no one perceives them at all. The argument from dependence commits us to the Berkeleyian theory of "relative existence"; as does also the notion of a special "sense-field" in which a given sensum occurs. Dr. Broad regards it as a merit of his sensum theory that it does not require the assumption of an absolute Space-Time. But "absolute" Space-Time is simply that in which things "absolutely" exist, and realism is committed to the rejection of "relative existence," and so of "relativity."

It may now be asked what reasons there are for supposing "sensible objects," which differ from physical objects, and which are brought about and affected by persons to a greater degree than the latter. In arguing that there can be no adequate reason for such a supposition, I shall consider mainly the question of "sensible" shapes and sizes. Dr. Broad explains "the notion of sensible appearance," in regard, particularly, to shape, as follows: "We know that when we lay a penny down on a table and view it from different positions, it generally looks more or less elliptical in shape. The eccentricity of these various appearances varies as we move about, and so does the direction of their major axes. . . . It is a fact that we do believe < that there is a single physical object . . . which appears to us in all these different ways >. It is an equally certain fact that the penny does look different as we move about."* There then arises

a difficulty about the relation between the round penny and an "elliptical appearance," or something "appearing elliptical." As regards the latter alternative (which Dr. Broad rejects and which he connects with the theories of Professor Dawes Hicks and Professor Moore), it seems to me necessary to point out that "appearing" is a relation, viz., that of being known or apprehended. So that what is apprehended in this case is that "something is elliptical," and, since this interpretation does not allow us to speak of "an appearance," the precise belief would seem to be that the penny is elliptical; a belief which is simply false. Now there are cases in which such a false belief is held, but in many cases it is not, so that it may be questioned whether anything "appears elliptical." In any case, "appearing elliptical" does not state a relation between *the penny* and us, except when we are wrong.

"Appearing elliptical" at least involves apprehension of a state of affairs, but, according to Dr. Broad, the "elliptical appearance" is apprehended without judgment, though it is apprehended as existing. This compromise is as unacceptable as that of Berkeley. We have something whose "whole nature" is apprehended (since an appearance is exactly what appears to a person), and then it is supposed to exist. As before, its nature and its existence must mean the same thing, and it must be perfectly indescribable. A similar point emerges in connection with the "different appearances" mentioned. Unless we think of a physical object as something which has to be known in its "whole nature," there is no reason why it should not have different appearances, *i.e.*, why different characteristics of it should not be observable from different standpoints.* And

* This seems to be a much more important feature of Professor Dawes Hicks's theory than any point about "looking elliptical"; he rejects the distinction between sensible objects and physical objects precisely because physical objects are complex. Cf. *The Basis of Critical Realism*, Proc. Arist. Soc. 1916-17, p. 342.

it cannot be denied that when we do know a physical object, we know a variety of distinct things about it. The recognition that, whenever we know, we know existences and that to know existences is to know states of affairs in which complex things occur, is sufficient to dispose of the theory of "appearances."

Thus an "elliptical appearance," in respect of the penny, can only mean a false belief. I have said that in many cases this false belief is not held; what visibly appears to us is the round penny (or the penny's being round), even though the round surface is not at right angles to the line of vision. The assumption underlying the whole theory of differing shapes and sizes, seen from different directions and distances, is that we look out at, or there visually appears to us, a plane projection of the visual field. It is quite certain that a penny may be so placed that its projection on a plane perpendicular to the line of vision is elliptical: it is equally certain that the further a penny is beyond such a plane, the smaller its projection on the plane will be, and that it may be so near the plane that its projection is larger than that of the moon. But if, as is the case, it is not true that, when we look out, we either look at or see things arranged in a plane, if we do see things at various distances and at various angles to one another—in short, in three dimensions—then the contention that a thing looks smaller as it retreats, or that a round disc looks elliptical when it is oblique, is robbed of its force. Since we see things in three dimensions, there is no reason why we should attribute to a thing itself the shape of its projection on a plane perpendicular to the line of vision, or see that shape at all.

In cases where there is said to be an "elliptical appearance," there really is something elliptical, viz. (assuming the surface affected to be plane and perpendicular, or sufficiently near the perpendicular, to the line of vision), that part of the surface of

the retina on which the rays of light from the object fall. As we are not looking at the retina, this does not affect the question directly. But it is sometimes assumed (on a theory similar to Berkeley's) that the retina is affected in precisely the same way, no matter how far the light has travelled; that consequently we cannot distinguish distances by sight, so that any part of a visual object, or field, must "visually appear" to be at the same distance as any other part. (What distance this could be is quite obscure). It is, however, perfectly conceivable that rays from different distances should affect the retina differently: even though "the picture imprinted on the retina" remained the same, the effects might differ in other respects. The fact is that we do see things at different distances, and if it is alleged that this must be due to something not given by vision, the answer is (a) that what it is due to is quite irrelevant, (b) that the objection involves the attempt to maintain that we cannot *see* what we actually do see.

But, though reference to the retina is irrelevant, there may still be something elliptical to be considered. We commonly see things against a background, and if that background were perpendicular to the line of vision, the shape of the part of the background concealed by the thing would be that of the thing's projection on a perpendicular plane. In this way an oblique penny may conceal an elliptical part of the wall of a room—and this also happens in cases where we are looking obliquely at the wall. Now we are just as capable of observing that an elliptical part of the wall is concealed as of observing the round penny; and the concealed elliptical part is just as much a physical object as the penny. In such a case, on a casual glance, we may fail to distinguish the distances of wall and penny, and suppose that the penny is elliptical. There is something elliptical in the same direction as the penny, something moreover of which we only *see* the shape, and there is a consequent possibility of our attri-

buting that shape to the seen penny. If, however, something in the appearance of the object suggests that it is a penny, then we doubt the supposition we have made, and by stricter attention observe that the penny is not in the plane of the wall but is oblique and round. The previous mistake may be described by saying that we had "displaced" the elliptical shape from the wall to the penny, just as we might displace the red colour of red spectacles to the things we saw through them. Also, the fact that we know that the penny is round need not prevent us from making the mistake; it would only require to be two different processes which had the two beliefs, and we should attribute "knowledge" to that process which was able to overcome the other when they came into conflict.

It is possible for us, then, correctly to distinguish something elliptical from something round, the two being physical objects occupying different places; whereas, if we could only distinguish things in accordance with their projections, almost all our observations would be mistaken. It may be said that we can judge or discriminate best the shapes of surfaces which are perpendicular to the line of vision.* But though we could less easily distinguish a circle and a nearly circular ellipse if they were lying obliquely to our vision, that would not prove that we see their projections. We may tend to err by assuming that the easier conditions are fulfilled, but it *is* possible, when we are presented with an oblique circle, to "see it circular." Again, we can judge sizes best when the things compared are close together; but we *can* see a distant tree larger than a man near at hand, who, if he stepped aside, would conceal the tree, and the relative sizes

* According to James, it is because getting things into a perpendicular position gives us the best means of recognising them by shape, that we call the shapes projected under these circumstances the "real shapes" of the things. Cf. *Principles of Psychology*, vol. II, pp. 237-240.

of the projections only appear to us in terms of concealed portions of a common background. Improvement in discrimination is possible, and may come about with the aid of other senses, as well as through the movements of the observed things and of ourselves in observing them. But it could never begin if we saw a flat picture.

I have considered at length the case of "elliptical appearance" in order to show the kind of mistake that is possible (though not necessary), and the possibility of correcting it by means of other judgments. I regard the general theory that I have advanced, as showing that an account along similar lines could be given of more difficult cases. In general, it cannot be maintained that in this (or any other) sort of apprehension, judgment, *i.e.*, apprehension of states of affairs or situations, is not involved, since (a) it is always something that appears elliptical or smaller; we do not apprehend "ellipticity" or "smallness" by itself; (b) that something is always taken to be in some particular place. Any such judgment will be either correct or mistaken; but correction will only occur by means of judgments of the same order. At no time in the process of making our observations more precise, *i.e.*, of *discovering new distinctions and connections, as well as previous errors* (and it is just in these ways that, on any view, we extend our knowledge of physical objects), do we suppose that we are not observing the things themselves and their actual shapes and sizes; at no time do we distinguish a "datum" or "sensus" from a thing. There is no thing or quality, then, which we can suppose ourselves to know "all about"; discrimination and association are always possible—whereas a "datum" could enter into no proposition. The same considerations are applicable to all the so-called *sensa*. The artist comes to discriminate and *know* colours better; and we can apprehend by sight many other qualities besides colour. What we see, like what we apprehend in any other way, is always

complex, always a state of affairs; and the physical object is no more to be supposed to lack the "secondary qualities" than to lack the shapes which we see.

III.

The fundamental reason for rejecting the term "consciousness," or "awareness," is that, like "sensus," it involves the notion of "relative existence." This is brought out very clearly in the account given by Professor Dawes Hicks (*l.c.*, p. 319) of the theory of Meinong. "With the doubtful exception of certain feelings and desires, he lays it down as a characteristic feature of the psychical, in contradistinction to the non-psychical, that it is directed upon something . . . A physical event can be described in and for itself. Not so a mental event. To speak of an act of awareness simply would be to speak of that which is never met with. Awareness in and for itself has no existence, and, indeed, no meaning; a 'something' of which there is awareness is its indispensable correlative." The natural conclusion would seem to be not that a mental event cannot be described in and for itself, but that it might possibly be described as feeling or desire, and that, however described, it may have the relation "awareness" to something else. Yet we find so realistic a thinker as Professor Alexander declaring that consciousness is the sole quality of mental acts, and denying that the unconscious, *i.e.*, any process which does not know, is ever mental.

That he is really setting up mind as "that whose nature it is to know" is made quite clear in the account which he gives of experience.* He begins, realistically enough, by asserting

* Space, Time and Deity, vol. I, pp. 11, 12.

that "any experience whatever may be analysed into two distinct elements and their relation to one another." But, he continues : "The two elements which are the terms of the relation are, on the one hand the act of mind or *the awareness*, and on the other the object of *which it is aware*; the relation between them is that they are together or compresent in the world *which is thus so far experienced*." (My italics.) Awareness, then, means both the relation itself and one of the terms.* It is as if we should say that the terms of the relation, paternity, are on the one hand the father or the paternity, and on the other the child of whom he is the father. But the last phrase italicized shows the identity of Professor Alexander's argument with that of Descartes. In each case an account is to be given of knowing or experience, and in each case it is assumed that what is found, by the observer of the experience, to be involved in it is experienced by the person having the experience; *e.g.*, all that I know about your knowing must be known by you in knowing. This is what James calls "the psychologist's fallacy." Certainly, the two terms are required for the experience, but this does not mean that both are experienced.

If they were, the distinction of *-ing* and *-ed* would disappear. Yet Professor Alexander actually uses this distinction to support the view that "the two terms are differently experienced. The one is experienced, that is, is present in the experience, as the act of experiencing, the other as that which is experienced." In other words, the one knowingly knows, or is known as knowing ;

* Professor Alexander refers in this connection to Professor Moore's "Refutation of Idealism." There Professor Moore certainly speaks of the awareness as having the relation "knowing" to its object; but in "The Status of Sense-Data" he speaks of *something* which has that relation, and by a mental act he appears to mean apprehending, *i.e.*, the relation which the something has to the object, and not the something itself. Cf. *Philosophical Studies*, pp. 24, 5 and 174, 5.

the other is known as known. And to complete the parallel with Descartes, we have the statement that "my awareness and my being aware of it are identical." Now, no doubt, if an experience is experienced or known (though there is no more reason for saying that this must be so, than for saying that a marriage must be married), the knower must be known as knowing and the known as known. But this gives no ground for saying that in any experience the knower knows his own knowing, or that there are two ways of knowing, enjoyment and contemplation, such that the mind "experiences itself differently from <the physical things which are objects to it>". It *is* itself and *refers to* them."* No such identification of the character of a thing and the relation of knowing, or experiencing, is possible. It merely makes "knowing" ambiguous, and resurrects the notion of "that which knows itself." For mind to *be* itself is not to know at all; and thus no definite meaning can be found in the terms "enjoyment" and the "quality of consciousness."

Unless, then, mind can be contemplated by mind and found to have certain qualities, we cannot know minds at all or speak of their knowing. It is precisely the Cartesian type of theory that leads James to argue, since he finds that only one term is experienced (is *-ed*) in an experience, that consciousness does not exist. But, if so, no satisfactory account of the terms "knower" and "known" can be given; James's theory of intersection would make them interchangeable. It has to be admitted, in fact, that we do observe situations of the sort "A knows B" (whenever, *e.g.*, we take part in a discussion). And this implies that we know A, as well as B, as having a distinctive character, and not simply as knowing. Such characters of mind are found whenever we say that anyone is angry or pleased or afraid. It

* Vol. II, p. 80. *Italics in text.*

is, of course, argued that these characters are "attitudes" to things, *i.e.*, involve relations; that anger, *e.g.*, is always anger *at* something. Now anger, or any other feeling, has always an occasion, and a man, in being angry, may know what the occasion of his anger is. But he need not do so; it is admitted that a man may not know "what he is angry at." To say, in the face of this fact, that he cannot be angry without being angry at something, clearly depends on mere prejudice in favour of a theory of mind as essentially knowing. We have, then, empirical grounds for distinguishing between what a mind is and what it experiences; and we see that it is possible both that a mental process should know without being known and that it should be known without knowing (and, for that matter, that it should neither know nor be known).

This view is supported by the Freudian theory of the "unconscious." The term seems often to mean processes which are not known, instead of processes which do not know. But what is really meant is that the "object" of the process in question is not known. How, then, can it be said to have an object? It has to be remembered that Freud speaks of unconscious processes as "wishes." Now a "conscious" wish is *for* a certain state of affairs or occurrence; that is its "objective." To complete the theory, then, we have to identify objects with objectives, things known with things sought. This, it seems to me, is what is done by Professor Alexander in his "Foundations and Sketch-plan of a Conational Psychology."* Thus he treats *judgment* as simply the theoretical form (*i.e.*, the form in which the reaction does not directly affect the thing known) of *will*, and *will* as having as its object the state of affairs it is striving to bring about. "In all practical volition the *cognitum* is a proposition." "This proposition states the so-called end of the volition and

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states that end as attained. . . . The object in question is not necessarily conceived as future. It is the business of the act of will to secure its future existence. What is as a matter of fact future is thus made actual and present " (pp. 265, 6). And Professor Alexander holds (p. 245) that "theoretical and practical conation cannot be divided sharply."

In terms of a theory of this kind, we may say that an unconscious process has a tendency to bring about some state of affairs but has not done so ; and we may be able to find out what it *would* bring about if it were not obstructed or "repressed" (just as we can find out that a person would do something if he were not prevented), and so to describe it as an "unconscious wish" for that state of affairs. But still this is not its character, and it is important to observe that we can know ourselves or other minds as of a certain emotional constitution, whatever this brings about and knows. It is possible that all mental processes are of the nature of wishes, but in order to specify any one such wish we require to know what it is, as well as what it is *for*. We may know that a man is in a rage, while his rage has not yet found anything on which to vent itself ; and a repressed wish, while it does not attain its objective, can be known to exist and to have definite effects on other processes.

The theory of the wish itself indicates that knowing is not an inseparable feature of mental processes, but at the same time it enables us to give an account of knowing which is in accordance with the plurality of these processes and supplies an answer to certain difficulties. According to the realist theory "the known" consists of independent things in space. But, it may be asked, if what I know when I look at a chair is just something out there, which would be the same whether I looked at it or not (as I certainly take for granted in looking at it), how is it that I *know* that chair and not other things ; how is it again that I know certain characters of the chair and not others ; when all these

things and characters are equally *out there*? Must not those objects which I "select" be attached to my mind in some special way, which does not affect those equally present things which I do not know? On this basis, Professor Alexander's description of knowledge as "compresence" might be criticized, for, though he means by "compresence" presence in the same *motion*, it is a fact that we often recognize things to *have been* present which we did not notice at the time. The answer to the question depends partly on what has been said regarding the "whole nature" of things, *i.e.*, on taking things in propositions or states of affairs, there being distinguishable states of affairs in any situation whatever. In saying that specific features of our minds "select" specific features of our surroundings, we are only saying what can be said of any two things that come into relation. We can point out, for example, that the Earth and Moon move in relation to one another in terms of their *masses*, and that all other qualities of either can be neglected. If this mutual selection of masses is said to be our abstraction from the total situation, the answer is that no other type of relation could be stated or conceived: that we know things only as having specific characters and as occupying Space and Time. But the selection which we call "knowing" is made more precise if we can say that we *pursue* states of the things that surround us and they *satisfy* processes in our minds. It is still being stated in terms of the relations of two complex things, and leaves "subject" and "object" perfectly distinct and independent. And it is precisely in terms of the complexity of knower and known that an account can be given of error, which cannot be done on the "whole nature" theory. It is required that both knower and known should be changeable and should have internal distinctions.

In short, the foundation of the realist position is logical, and if this logic is not impugned, then, whatever the difficulties of

any special problem, it must be capable of being worked out in accordance with that logical basis. A theory of "sensa" or of "consciousness" could not be accepted merely because it enabled us to give a simple account of some limited range of facts. It would sooner or later be found to conflict with a logic of propositions; while that logic itself assists us to give a definite theory of the nature of "subjects" and of any particular class of "objects."



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W.C. 1, on January 10th, 1927, at 8 p.m.*

V.—THE DEVELOPMENT OF SOCIAL MINDS.

By J. H. HARLEY.

PLATO somewhere speaks of the philosopher as striving to attain an "extensive comprehension of things" and the idea is certainly appropriate to the conception of social minds. By social minds I mean minds whose material of knowledge is a cross-section including that of other minds in its scope and where the point of view is not that of the individual but more or less completely that of a larger or smaller group. Furthermore, as may be deduced from the reference to a point of view, the relation of the social mind to its material is not simply a relation of a mirror to its objects, or rather its victims. Though there is no reason to hypostatize the social mind and speak of it as an entity apart from its cross-section of knowledge, it yet exercises a special method of activity within its material, transforming it and working it up into forms which are more directly beneficial for its own purposes. The transformation of the material is thus forced more prominently into notice than the mere recognition or ordering of the material, and hence it might have been more appropriate to speak of "societal purpose" than simply "social mind." I retain the term "social mind" however, because it is much more comprehensive, and though it may not accentuate prominent qualities so decisively as other names proposed, it enables us to find room for all kinds of variant properties which go to make up the total result.

The opposite conception to the social mind is to conceive the mind as in some sense entrenched within the limits of the bodily organism. In this position of vantage, realities or "sensa" may

impinge on it and be really perceived or selected, but they must come to it, not it to them. Most prominent of these theories confining the mind within the limits of the body is that of Spinoza, to whom our thoughts and our bodies are simply the same mode of God under two different attributes. The result is, as Prof. Alexander put it, "that the idea which I have of the table informs me rather of the state of my body than of the table, or in other words, the table reveals itself to me in so far as it induces in me a certain process of body [we should say of the brain] which is identical with what we call the thought of the table." Mr. Durant Drake, one of the American Critical Realists, occupies pretty much the same position in his latest book. He defines the self as "the complex organism which receives impressions, manipulates them in the brain and uses the resulting complex of cerebral elements as cues for its action." He attributes our feeling of the continuity of mind to organic and visceral sensations, specially specifying, with James, the "sensations of the incoming and outgoing breath, the beating of the heart, eyeball and eyelid movements, forehead tension, etc." The great problem on such a view of the mind is that it should get "out there" at all. "Out there," as Prof. Drake somewhat positively [it is difficult to see on what evidence] asserts, there are "an inconceivable number of atoms flying about in inconceivably complex courses"; but our sense of out-there-ness is only the resultant of the occurrence in us of certain complex sensori-motor events. On such a view, where the predicate "out there" does not apply to these sensori-motor events themselves, it is difficult to see how we can get the mind out of its own place to be attached in varying social relations to other minds. It is snugly en-cased within the bodily organism, growing with its growth, becoming mature in its maturity, localizing all the higher exercises of intelligent activity within the complicated convolutions of the cerebral cortex, and presumably ceasing to function when the bodily frame of its respective organism is dissolved.

It is unnecessary for the purpose of this argument to examine into the implications of this view of knowledge and to consider, how far it is inadequate or contradictory. All that need be pointed out is this: that we cannot, if we are thus pent up within the limits of the individual organism, advance to any really satisfactory explanation of the social mind. The individual mind, with its curiously complex cerebrum, may bring to bear on another organism its consciousness of kind. A flash of recognition may pass between the two and the first then proceeds to "eject" himself into the second. Then the first introjects the second on himself and gains new outlooks in the process. Lastly, the first projects this transformed outlook on the second, and so the intricate sociological game goes merely on to its destined conclusion. But the point to remember about all this is that there is nothing organic about it. The intercourse between the two individualities is of a strangely external character. A attributes some of his own way of regarding life to B, but in the main the conclusion that B resembles A in certain essential respects is on the given premises an unverifiable assumption. Wendell Holmes once pointed out that where A and B are talking together there are in reality six people talking together—A as he is himself, A as he seems to B, A as he really is to his Maker, and the same three variations in B. There is nothing to guarantee us against a similar game of cross-purposes all over the wide scheme of the universe on any relation of merely outside inference between A and B.

Why not, then, boldly cut the knot of our assumptions and ask ourselves whether it is necessary to confine the mind within the limit of its own bodily organism? Prof. Drake himself, who defines the self as the complex organism of the body, tells us also that "the continual sight of the body gives a sort of visual evidence of the continuity of one's life." Here we seem well on the way to another point of view than that which regards the mind as simply

laying a trap for knowledge which comes too near the requisite instruments of its body. In this sentence of Prof. Drake the mind is conceived as regarding the body from a position of vantage as one object among many others in the world and as drawing certain conclusions accordingly. And when we think over the matter, that is an habitual attitude in all our knowledge and practice. In our healthiest states we are never at all concerned with the condition of our bodily apparatus. For aught we have to do with it in knowledge, the body might simply be a centre of co-ordinates which we have to carry with us everywhere to locate and date our experience. Things have gone sadly with us if an aching pain draws our attention to the bony framework containing the cortex, or if we are compelled to maintain a too-curious consciousness of the processes of circulation or digestion. So far as our normal healthier life is concerned, we are always "out there" and more particularly absorbed in the human world of men and women. We are only ourselves because we are distinguished from and yet related to them. The much-travelled Ulysses had gained all his vast experience by coming in contact with "strange faces and other minds"!

Of course it may be objected that such speedy conclusions ignore some of the strength of the opposing case. There is a peculiar sense of intimacy about our own body which differentiates it from all the rest of the world beside. It is our own, really our very own, and our most vigorous life throbs and pulses in its every vein. But even admitting this experience in the widest and fullest sense, it is possible to proceed on its basis a very large way into the midst of the world "out there." For man is at the earliest dawn of deciphered history, a tool-bearing animal. A German ethnologist even dates his assumption of the erect posture to the fact that from the first man defended himself by the throwing of stones. At any rate it is with the discovery of the "colith" (if that rude flint is ultimately accredited) that we hear

struck the first distinctively human note. Now what is the tool but an instrument which enables us to project this organic sense of intimacy right to the further end of our instrument itself? In one of the most attractive chapters of his "*Mikrokosmos*," Lotze has dwelt sympathetically on just this aspect of what he calls "Human Sentience" (*Sinnlichkeit*). The soldier (it is a disconcerting thought) feels his sentient personality up to the very end of the thrusting point of his bayonet. The young unshingled woman with nodding plumes (how remote Lotze seems!) feels her own self nodding and swaying with every motion of the plumes!

We can even go further and say that the mind pushes its tools into the social milieu and develops new faculties and senses in the process. The body itself is revealed in this regard as simply the mind's most indispensable tool, and when other more specialized tools are constructed and made available the range of our sense outlook may be very widely extended. Just as I write these lines the announcement is made that some very important work has been done in the perfection of what is called television. Here is how the inventor speaks of the progress of his researches: "My first demonstrations of television," he says, "were conducted with a powerful white light at the transmitting end. Then it occurred to me that I was not dealing with a human eye in my mechanism, but an electric one, which could certainly detect rays outside the range of human eyesight. So I turned my attention to the rays below the range of the eyes--the infra-red rays--and much to my own surprise the infra-red rays worked perfectly." These unsophisticated words reveal the habitual attitude of the inventor. He is already "out there" testing and experimenting, and his personality overflows into all the instruments which he uses.

Physiological psychology informs us that the cerebrum was built up originally as the nerve centre of the sense of smell, but it was then gradually supplemented or dominated by structures

relating to vision. It is this development of the sense of vision, when reinforced by a more refined sense of touch, which has made of the body a more efficient tool for action on the outside world and rendered it possible to get "out there" in such a way as to profit by human inventions and institutions. The most distinctive feature of the scientific advance during the last few decades has been the increased use of delicate instruments of precision, and every one of these instruments meant more complicated motor adjustments and an advance of human sensibility into more complicated relations with the surrounding environment. In such a condition of things the mind cannot be held up by any bodily integument; it can only cope with the intricate problems it has to solve by observing the effect of the minutest new device in the instruments it uses—a result which could hardly be attained if it were not at the very place where these tiny devices are manifesting their power.

II.

Man's tool-using propensities, however, have other important consequences. In the definition of a "social mind" given in the first paragraph of this paper it was declared that such a mind possessed as the material of its knowledge a cross-section which included portions of the knowledge of other minds in its scope. Here we come on one of the most authentic notes of a real social fact. The tool-bearing human in his operations on the environment is not left without a response. It is not long before he is conscious of the operations of others of the same kind who are "out there," just as he is. What is his exact relation to them? Are they separate individualities who are separated from him by an unplumbed sea, or can the mind of the one immediately find points of attachment connecting him with the mind of the other?

In his book on "Science and the Modern Mind" Prof. Whitehead claims that "organisms can create their own environment. For this purpose the single organism is almost helpless. The adequate forces require societies of co-operating organisms. But with such co-operation, and in proportion to the effort put forward, the environment has a plasticity which alters the whole ethical aspect of evolution." The observation is a very just one, but the process involved in it requires vindication. How do organisms co-operate together? What is involved in this contact and co-operation of minds? The reason, as we have now begun to discover, is that the human minds are not shut up within the limits of the organism. At once they begin to burrow into their environment, until ultimately their environment becomes largely a system of artifacts or mental constructs which are the common material of a series of co-operating minds and which attaches them one to another in the unity of a common functional activity.

We have only to examine the records of man in his historical progression to find conclusive evidence of this formation of a common world of artifacts. William James somewhere says that the knowledge of the individual starts from a condition of "booming, bustling confusion." Whatever is the case with the individual, however, this lurid description does not hold good of the race. The savage world, from an external point of view, may seem a world of unmitigated confusion, but when we examine it sympathetically we find that, though it is not our world, there is still some method in it after all. At any rate, the whole savage landscape is suffused with common emotions and mystic suggestions which exert the same power on every savage of the group. Roads, rivers and clouds are not what we mean by roads, rivers and clouds; they are entities to the savage replete with terrifying powers. What would be a stone or tree to our more sophisticated minds, to him might convey the suggestion of some maleficent mana. Direction or space, which to us conveys the notion

of cool and unemotional geometrizing, is never with him devoid of mystic and disturbing suggestions. The very solid ground on which he treads exudes some vitalizing influences. What does all this mean? What but this: that the savage looks on Nature and life through the eyes of the social mind. His organism works along lines which the community traces and with results which connect his mind through the possession of this common experience with the other minds of the group. We cannot understand either the savage himself or his life unless we possess the key which unlocks the door to his jealously guarded social traditions. Most stringent precautions are taken to guard the community against any unholy attempts at individualism. All the young men of a certain age are formed into a young men's society and they are then instructed by their elders in the sacrosanct tribal traditions. Circumstances of the utmost solemnity surround these initiation ceremonies. They are combined with every complication of ritual which can impress on the younger men the requisite spirit of awe and fear. The consequence is that we have to make a very considerable effort if we desire to get at the back of the black man's mind, and we certainly cannot attribute to primitive man the psychological processes which might be valid for the man of to-day.

How can the savage ever become a solipsist? His world is not the phantasy of his single unaided imagination. It is a world which he shares with his tribe and which has slowly grown in the immeasurable reaches of his tribes' previous history. This atmosphere of common social traditions is the friendly medium which assures the contact of variant minds and makes it impossible for us to consider the individual apart from his tribe. Any historian who would understand a particular savage has not to study his individual mind, but the more extended mind of his common social traditions, which unites itself with the minds of all his tribal friends and neighbours.

That is why the modern demand in historical research is for the study of contemporary documents. This demand may seem at first too insistently pressed, until we realize that men and women look through the eyes of their contemporary social minds, and if we do not know their contemporary social minds we may be attributing to them thoughts which are absolutely foreign to their real point of view. It is no defence that we are ourselves realists and that we have torn off the trimmings to look at the real inside of things. Where we behold the summit of Mount Everest challenging our climbers, the Tibetan sees only the chosen abode of all kinds of envious demons. That is why we are often startled when we do come in contact with contemporary documents at the very different mental possessions to which these documents appear to bear witness. We cannot study Gregory of Tours as we would the productions of some modern rationalist. A simple reference to his *Book of Miracles* is sufficient to show the very different world in which he habitually lived and moved. The recently published *Fugger News Letter*, too, shows how indispensable it is to the understanding of even such a recent period as the sixteenth century that we should know something of the common possessions of the sixteenth century social mind. In this interesting contemporary document we read, as an ordinary item of news which would generally be accepted as credible, of "Miraculous Healing by a Hermit," "Driving out of Devils in Vienna," and we are further informed, with all the pomp of a thoroughly circumstantial statement, that "in the county of Polomos, in the kingdom of Catalania, upon the first day of May, the day of the Holy Apostles Felipe and Jaime, in the hamlet of Colongo, there was seen by all the people a terrifying storm and a huge cloud, in which could be perceived a whole legion of evil spirits, of various shapes and most loathsomely deformed." Was there ever a clearer example of seeing only the artifacts of the social mind?

Nor can it be truly asserted that as so-called civilization progresses the influence of the social mind gets correspondingly less pronounced. The rise of the modern State is marked by the increased aggregation of population in the greater cities, and in the cities man is habitually surrounded by the artifacts of his own social mind. Indeed, when we come to generalize our argument and apply it to the whole course of human knowledge and activity, we discover that humanity has only made progress through the combined efforts of many generations and by the formation of common traditions and institutions which enable the individual to develop a social mind. It is language which first makes possible the full utilization of this co-operative activity. Language is a way of associating common ideas with socially recognized sounds, and language serves as the medium of that intercommunication without which there could be no socially efficacious thought. Language, however, and the artifacts of language, are a product of the tribal mind ; each tribe has its own characteristic form of language. The wealth of the language has only been slowly amassed as the society has passed from gesture to picture and from picture to all the refinements of the most developed modern tongue. Language enables primitive man to distinguish and develop his thought just as the Togos, for example, when they wish to express the idea of bring, do this in three stages by words which respectively express the ideas of take—go—give. In this way the thought is limited by the medium through which it is expressed, and the individual organism is powerless until it is passed down folkways to acquire a social mind.

Once, however, there is this common and accepted medium of communication, and the social consciousness goes triumphantly forward in its manufacture of artifacts. The spoken speech leads on to written symbols, and a very decisive step towards the cementing of social minds is taken with the general acceptance of the letters of the alphabet. Any one individual only contri-

butes a very little to this great social movement. It is the whole society, the combined efforts of many along the well-trodden paths of the folkways, that produce the ultimate results.

III.

In this great historical process which strengthens the consistency of the social mind there are some stages of outstanding significance. One is the adoption of gold or silver money as the medium of exchange—a use of social artifacts which may well be said, in Dr. Whitehead's words, to have altered "the whole ethical aspect of evolution." There is no doubt in this case about the operation of social activities. The piece of money is stamped with the effigies of the king or chief in order to show that it is with the endorsement of the social community as a whole that the coin is issued to perform its functions. Different other materials—wampum, cowries, cattle—have become media of exchange in the earlier course of this communal development, and in the case of gold a great deal of mystical meaning attaching to it had to be disregarded before it could be handled without fear of consequences as a medium of exchange. This supreme development of heroism would have caused the individual mind to quail: it could only be accomplished by the reinforced strength of a social mind whose individuals it cemented together by cash payment, which Carlyle denounced because in his own darkened days it constituted, as he so sadly put it, the "sole nexus between man and man."

The most interesting chapter, however, in this record of the development of the social mind in social institutions and the manufacture of social artifacts is that which tells of the communal manipulation and articulation of the ideas of space, time, and number. Here absolute agreement was eventually reached, and the language of geometry or algebra became a universal notation

acknowledged by all the civilized nations. In the case of language, so indispensable and primary for the development and even for the possibility of a social mind, there is no consensus of agreement among the different tribes and nations as to the universal sound symbols of which use should be made. Each particular nation, and sometimes every petty tribe, developed its own peculiar language, and early legend in the story of the Tower of Babel testifies to the obstacles which such an impasse put in the way of more perfect intercommunication. But in the case of space, time and number, the resulting communal symbols became so fascinating to manipulate and, when manipulated, they showed the way to the solution of so many problems that, when suitably generalized and refined, they were elevated to the dignity of the presuppositions of human thought itself.

Certain tentative manipulations of geometrical figures appear to have started the work in this direction and to owe their first conception to the priestly associations of Egypt. A very special point to be considered in regard to the early geometry is this: that it arose out of that rise and fall of the Nile which is of cardinal importance in the history of early civilization. The fields of the cultivator were flooded on the occasion of the annual irrigation, and when the water subsided these fields had to be remeasured and divided and the equivalent of his old plot assigned to each anxious peasant. In this way the properties of figures, angles, and boundary-lines were brought into the question and the data for the consideration and recognition of these figures were supplied directly from experience, *i.e.*, from the very territorial framework of the earth itself. After space came time, and at once we have a concept which, though ubiquitous in our own modern contemplation of the world and events, has yet only reached after a very lengthened process of social development. Primitive man has no kind of regular habits. He gorges himself to repletion and then he is content to wait for long and varying periods until

nature reasserts herself and he finds himself hungry again. His alternations of work and idleness in these irresponsible days follow only the dictates of his own sweet will. But the social mind is ever active, and after some travail of spirit man begins to reduce time to a common measure and thus attains a certain certainty of punctuality. It is impossible here to go into the details of this communal process. First the moon was observed, then the sun, and finally we had days, weeks, minutes and seconds, and the reformed Gregorian calendar. The philosophical consideration to be chiefly kept in mind is this: that in this communal search for common measures of time the concept of time itself was spatialized, and there is no support given to modern speculations which look upon such spatialization as a falsification of the true developmental import of the real Time.

Number, too, has its lengthened course of development before we reach any measure of universal agreement. Some primitives can only count up to two, though afterwards we find the fingers of the human hand used as the basis of a more extended system. The Arabic numbers, however, were a crowning step in the progress of the social mind, and we have only to compare them with the abacus or the notation which the Greeks used for numbers in order to see what they signified for the total achievement of civilization. As generalized in algebra, the numerical system has become a universal notation which, like the Russian ballet, can vault over all the barriers interposed by language and nation.

This emergence of the concepts of Space and Time raises, however, some very important problems, which are fundamental for all the operations of the social mind. It was Kant who, with mathematical knowledge plainly in his mind, put at the outset of his first Critique the very significant question: "How are synthetic judgments a priori possible?" Is it because they are universally admitted? Is it because all the people over all the earth, and through all the times, have been unable to refuse to

admit them? Does the social mind guarantee the products of its social manipulation by the fact that they are the result of a communal development in which individual perspectives, say in space, are eliminated, and the result is a concept in which all the community can share? This is a pragmatic test of truth, but it hardly seems to go far enough in the way of validating an idea, which certainly is fundamental in the consideration of the social search for truth.

It is impossible to discuss such a large question simply in the course of our stride, but one or two points are plainly relevant. In the first place, the geometrical constructions which are fundamental in the development are directly based on experience gained on the earth itself. Further, as has been already remarked, time is spatialized and therefore directly bases itself on space. Finally, these particular artifacts, originally based on territorial experience, are still further applied and generalized in the course of further experience, and have proved themselves in this articulation capable of anticipating experience, *i.e.*, they have been developed in a direction which subsequent experience has shown to be implied in the general course of events. In their modern form, indeed, of the time-space continuum, these concepts of the social mind have been so successfully articulated that they are held to constitute the very framework and foundation of every kind of knowledge. They also enable us to work our way to some kind of a rationale of Error. If these mathematical artifacts do really enable us to anticipate experience, this means that the social mind has gained confidence in its manipulations, and that it is not dependent simply on inductions applied to that experience for the extension and refinement of its fundamental thoughts. The anticipated development, however, may not at the end be vindicated by the course of experience; it involves an Error. Its constituent elements are all right, and all acknowledge their basis in experience, but their combination is obviously wrong.

The assumptions are falsely made. But still the social mind cannot avoid the exercise of imagination; it exercises itself in making all kinds of combinations of these easily manipulated ideas. The earliest art-figures on the walls of caves and on the bones of a reindeer were combinations of lines and angles and arcs. Imagination, of course, can likewise commit its errors; it can combine its figures in a way which earns no approval and does not afford sustenance to the social consciousness of its own or any succeeding time. William Clissold need be no kind of artistic replica of Mr. H. G. Wells. He may be a purely imaginary figure, and his opinions a *mélange* of the most vaporous ideas of his day; but if in his own or in any succeeding generations he attaches himself to human hopes and fears, this secures for him his measure of artistic immortality. He is connected with a certain book written by a certain author who lived at a certain year of a certain century, and, enshrined in the social mind, he becomes incorporated in the schematism of reality by a realistic process of location and dating. That was what the writers of the *Fugger News Letter* did when they desired to commend their lurid visions. They gave the name of the province and the district and all the other circumstances of time and place and individual which were necessary for the claim that this particular experience had been placed and dated among the permanent institutions cementing the social mind.

IV.

Up to this point we have been speaking of the social mind in the singular, and it may well be asked when we are going to rise to our title and consider social minds in their plurality. It is necessary, however, in any discussion such as the present, to make the way perfectly clear from the beginning. There are those who would confine the human spirit within its own darkened

tabernacle, and before we can deal with the variant possibilities of social minds, it is necessary to vindicate the abstract possibility of a social mind at all. Besides, as the social mind first makes its appearance in history, it is relatively homogeneous and undifferentiated. The first societies are what an American sociologist has termed the primary societies. They consist of two, or ten, or twenty kindred people who meet face to face, who get to know each other, and who daily make more binding the common ties of usage and customs which unite them one to the other. These societies are so small that there is no possibility of forming groups within the group; but the period of human childhood is so long that the younger generation attain maturity with their activities all directed along the common folkways traversed by their elders.

In considering the development of social minds it is impossible to start with the abstract individual, as in the famous Social Contract theories of the development of the State. There has been a temptation to resort to the same procedure in recent years because of the increasing vogue of Human Psychology, which in the very nature of the case is bound to take a start from the nervous system of the single individual organism reacting on its environment along its appropriate cerebral pathways. To this study is attached a special department called Social Psychology, which has much to say about instincts, and which has devised an elaborate paraphernalia of projection, introjection and ejection to account for the transfer of group habits from individual to individual, and for the consequent co-operation of two or more individuals in the attainment of common ends. Other names for the principles at work in this process are Imitation, Suggestion, and Sympathy, and the result is that the individual, while never forgetting a single one of the abstract rights of individuality, does get connected in a certain external fashion with several others to form a more or less stable group.

Our previous discussion, however, has served to show that when we consider the matter not from the psychological but from the sociological point of view, we must start not from the individual, but from the more or less differentiated group. The unit of sociology is not the abstract individual; it is the individual with points of attachment. He is already "out there" in his environment, even if it is only to throw a stone or to flake a flint. His family life is not the casual family arrangement of some of the animals, because his young are so helpless that they have to be taught the family acquirements through a more prolonged period of childhood. The infant is consequently developing points of attachment to the parent from the first, and these points of attachment constitute a common world for the group. The knowledge of the one develops the knowledge of the other, and superimposes on the space-time continuum which unites the whole world of knowledge, that intricate special tissue of traditions, customs and social institutions which is the primitive cement in the more special world of the group.

No human being, however, exhausts all his capabilities of attachment within the limits of a single group. The more the course of history advances, the more intricate grow the groups and the more extensive become the ramifications of those who are working within the groups. In ordinary experience there is not only that general consciousness of kind which some sociologists regard as the dominating principle in their science, but there is also a special consciousness of kind, or a consciousness of congenial kind. That means that the one recognizes the other as having in a very real sense a common world. Their objects and ambitions are so much the same that they are fitted for some really organic co-operation. For example, a man may desire to join a certain society because he feels that he takes the same view of the objects regarded as desirable by that society as do those who are actually members. At the same time he has sent

to him the constitution of the society, and he has then to consider whether he is ready to co-operate with the others along the pathways indicated in that document. If he does join the society he is at once connected with all the rest by interbranching pathways of social tissue.

All this implies that there is a certain power of imitating and co-ordinating its motor activities in the constituent individuals of a group ; and that we must certainly presume. In a complicated state of society you cannot set a limit to the number of the groups : perhaps that is why it is not feasible to base the franchise of the modern State wholly on the representation of such groups. That is also why the question is raised : What really constitutes a group ? Do two or three persons meeting in the street constitute a group ? Or does a mob constitute a group ? Or does the question depend on the time the members of the group really act together and thus resolve themselves into a more or less permanent contact of minds ?

The reply is that for a real group in the sociological sense a certain amount of internal structure is required. A mob may develop untold energies of fanaticism and may be responsible for effects far transcending the powers and even the imaginations of any of its constituent parts : but a mob is only a temporary group of units brought together by the fact that they are swayed by common gusts of sentiment and feeling. They do not remain together long enough to develop any kind of permanent structure. There is no constitution to be settled by the mob : its units are hardly cool enough to undertake the more helpful art of discussion. An appreciable number of the attachments we form in life are of this structureless and temporary kind. There is a large amount of experimental adventure in the formation of our private friendships : but all throughout these experiments it is not the case of an abstract individual seeking attachments in a group. The individual who experiments is a social individual. He is

already in permanent groups with their appropriate attachments of social tissue. He handles the tools of his trade. And what he is seeking to do is simply to render the social tissue of his life more intricate and complete.

In any complex society there are certain main varieties of social tissues within the entanglement of which the different social minds are developed. These main varieties are (1) Kindred, (2) Economic, (3) Artistic, (4) Religious, (5) Legal, (6) Political, and (7) Intellectual. It cannot, of course, be said that this is an exact order of historical ideas because, as Spingler has suggested, history may not be a linear advance but the chronicle of a series of civilizations which have risen and fallen and which each of them reproduces with a difference--the leading phases of the others. Generally, however, it is true that the enumeration of these varieties proceeds from the simple and general to the complex and special. The simplest and most general attachment is that of the kindred, and no human can choose either where or when he shall be born. This is a fact which easily lends itself to the purposes of those latest youthful products of our civilization who turn sharply on their parent and ask why they should owe him reverence, seeing it was no choice of theirs that he should stand to them in this dignified relation. As we go down the scale, however, we find that fatalistic suggestions disappear, and within the directions imposed by the general character of the social tissues there is a large part reserved to social option in the development of different social minds. A society formed to advance certain intellectual objects is a voluntary association with none of the compulsory implications of kindred. The tissue is of the most intricate and extensive character. The adept in this particular line of knowledge knows something of the past work done on the subject which is embodied in different social institutions, and he has to choose whether within the limits of the common knowledge possessed by all who develop social minds in this group he can find any points of

specially congenial attachment with others in whom he seems to recognize a common spirit. But no one forces him to join. There is no invidious bar of birth to make it impossible to exercise an individual option.

The Belgian sociologist, Dr. Greef, makes use of an illustration which throws a large amount of light on this differentiation of social tissues. He recalls that as individual men or women get older they tend to live more and more in the memories of childhood. "The thoughts of youth are long, long thoughts." The memories of the intermediate periods of their life appear to have passed away. The ambitions, the painfully acquired experiences, of later manhood have ceased to charm. They are children again, playing on the village green. So in the development of social minds from simple and general to complex and special varieties of social tissue. In the complex modern group it may be said that war is a dislocation of all man's nicely adjusted organization—just what happens in old-age to the individual. Is there the same result in the State? Precisely the same. All the recent acquirements of civilization, the habit of political toleration and free discussion, the intellectual spirit of internationalism, are forgotten. Society lapses into a period of more primitive credulity when black-whiskered Russians are beheld peopling mythical railway carriages and University professors desire that their foes shall be slain by the sword of the Lord and of Gideon.

Another observation may be validly made about these general varieties of social tissue. In the region of the more simple and general there is a greater preponderance of the fixed and authoritative. The social minds here developed are bound by rigid and unbending taboos. The man must marry exactly into that totemic class which inviolable usage has dictated. The recalcitrant trade unionist must be picketed and "peacefully persuaded" if he threatens to let his society down in the midst of an industrial dispute. But as we approach the complex and

special, this appearance of the rigid and authoritative ceases to become prominent. Free discussion changes the outlook of politics. The voluntary association immensely extends the area within which free choice is possible.

If a complex society has to be changed and a revolution is to be ultimately successful, it has to begin with the simple and general. The alteration of the more prominent political arrangements, the change from a king to a president, leaves in itself little impression on the social minds in the mass. If the economic structure, for example, is authoritarian and the economic structure remains after the revolution as it was before, it is certain that the revolution has no great chance of attaining to a state of sufficiently permanent stability.

Within the conditions set forth in the preceding paragraphs it cannot be doubted that social minds can be effectively developed. Such social minds, too, will exercise functional activities quite beyond the power of the single individual. How could it be otherwise? There is a large world of communal artifacts making consistent the connections of the social group. Let there be a motor movement from one side, it will modify these artifacts; and then from another side use will be made of the transformation to carry the development to more intricate issues. Thus proceeds the fruitful process of creation continually operative in the activities of social minds. If it be asked what exactly is the status of a social mind, whether an organism or superorganism, the reply is that we cannot exactly say. Each one of us is only a unit of several social minds, and though we have transcended the individual point of view, we never become the group, any more than the individual cell becomes the whole body. We know that the social mind functions, and that it functions on a vaster and more efficient scale than we: but beyond that we must take refuge in a reasonable agnosticism.

V.

A short postscript on the general view of the world implied in this paper may tend to clarify our ideas. It has been seen that social minds are developed in tissue which varies from simple and general to special and complex. This appears to imply that a society gets more intricate and advanced the more its complex tissues get concentrated at particular points. Is this the customary course of social evolution? As the course of development proceeds, do we find tiny islets of more advanced and intricate life surrounded by giant masses of social tissue which is very much less finely developed?

To some extent such a conclusion could not be completely justified. Political development finds its leading embodiment in the State, and the State is founded on territory, *i.e.*, it is directly attached to the space-time continuum itself. Now the territory of the earth is not of infinite extent, because the earth is elliptical and its round of territory therefore closes in on itself. That means that the social space-time continuum possesses curvature, and if the whole territory were divided up into States and provision taken by means of a League of States to prevent any forcible invasion of boundaries, we might arrive at a limitation in the development of social mind so far as the multiplication of new States is concerned. The measurable territory of the world would then be occupied by a perfectly definite number of States united in a League, and other smaller social unities would find their location in the space-time continuum of the State. From this point of view the development from the simple and general to the complex and special appears to result in a rounding-up and limitation of the field of development, which should permit the more complex social tissue to spread over the unoccupied portions of the total space-time continuum.

At the same time, if we survey the most advanced social communities as a whole, we shall find that, so far as present

conditions are concerned, there does seem a tendency to get the more complex and special concentrated at particular points. Town and city life are the dominating factors of the social development of our own days, and town and city life mean huge aggregations of population pent up within a limited space and almost completely confined to the contemplation of the social artifacts which we have already discussed. The memory of a town-dweller consists of a background constituted by his own neighbourhood in the city, and the events that pass through his mind are located and dated in this artificial environment partly by aid of a chart or map, which he either spreads out in the background of his memory or keeps extended before him on his working-table.

In these circumstances the only hope is the improvement of the systems of communication. The advances in methods of communication have already enabled social development to become independent of simple face-to-face intercourse between varying minds. Social minds can now develop by attaching themselves to others widely separated from them in space, and the world gets really smaller as every new stage is reached in this search for more speedy methods of travel both by land and sea and in the air. Prof. Marshall once hazarded the opinion that the advance of electrical discovery and organization would bring factories into the country and render illusory the distinction between country and town. Doubtless this will be part of the solution that will give a more satisfactory aspect of rationality to the progress of social development.

What is the ultimate goal of the development of social minds? We cannot tell. In the nature of the case, and not being ourselves at the centre of the universe, we cannot be expected to tell. But the territorial surface of the earth with the human beings in contact with it is a limited and measurable slab of the time-space continuum, and the social artifacts in this slab can form new connections between social minds of increasing intricacy and com-

plexity. States may merge into larger federations, and voluntary associations embracing all kinds of subjects, and covering all the ambitions of human life, may constantly be formed. The abstract individual becomes a centre of attachment for immeasurable threads of social tissues combining him with an increasing number of his fellows for the attainment of a larger number of different objects. A cross-section of his experience include more and more of the experience of many others. It would be a wellnigh impossible task to say when the individual begins and when he ends. But in the latest voluntary associations, as has often been pointed out before, there is no outward constraint laid on the constituent elements of their different social minds. Here we come upon the real Social Contract. Was it not anticipations of such a development that Maine had in his mind when he said that society progresses from status to contract ?

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on January 24th, 1927, at 8 p.m.*

VI.—MILL'S VIEW OF THE EXTERNAL WORLD.

By H. H. PRICE.

It is generally agreed by philosophers that the particulars or somethings, of which we are aware in sight and touch cannot be parts of the surfaces of physical objects: so long, at least, as we understand by a physical object a single relatively permanent substance, having a closed boundary in space, situated at any one moment in one single position, and continuing to exist and to interact with other like objects even in the absence of all sentient beings. If then we still wish to maintain that we are immediately aware of physical objects, we must take one of two courses: *either* we must hold that we are aware of them by some other, non-sensuous kind of awareness: *or* we must alter our conception of what a physical object is.

The first alternative seems to have been maintained (though with some hesitation and much obscurity of language) by Thomas Reid and his followers; and it has been revived by certain modern Realists. Reid blames his predecessors for failing to distinguish between *sensation* and *perception*. When (as we say) I touch a table, I do not merely feel a set of pressures, having a certain pattern and a certain intensity, as philosophers like Berkeley and Hume suppose. The sensation is attended by another quite different form of experience, viz., by a direct awareness of a certain physical object, in this case of a smooth, flat, rigid object with a right-angled corner. This other kind of

experience, or mental act by which every sensation is attended, Reid calls "perceiving." The function of the sensation is to *indicate*, or draw my attention to, this object rather than that.*

A view of this kind is very difficult to refute. I can only ask, do others have this immediate non-sensuous awareness of physical objects? If they have, they are to be congratulated. For my part, when I have the tactual sensations just described, I certainly am strongly "under an impression that" a table exists, that my own body exists, and that they are in contact. But I do not seem to have any *immediate awareness* of these objects and these facts; and so far as I can see, this impression that I am under may be completely erroneous. Perhaps we do know with respect to any datum of sense, that "this is not all that there is." We are perhaps immediately aware in a confused way, of a Something More, of which this datum is as it were a fragment: but we certainly have no immediate knowledge of the detailed nature of this something--still less do we know immediately that it is physical or material, least of all that it contains a flat-topped table, and a human body in contact with it.

We must therefore consider the second alternative,† that we should change our conception of what a physical object is. We

* Unfortunately Reid prefers to say that sensations *signify* (or "suggest") the presence of physical objects: he also speaks of them as *natural signs*. This lays him open to the retort that A cannot signify or suggest B to me, unless I am already and independently acquainted either with B or at least with things of the B kind: and that the phrase "natural sign" is a *contradictio in adjecto*. But the truth surely is that he meant by "signify" and "suggest" what we mean by "indicate." And that is precisely the reason why he falls into the absurdity of calling his signs natural. These remarks will also apply to Professor L.ird's view expounded in his *Study in Realism*, Ch. 2.

† The other possible view, that the existence and nature of physical objects is known, or comes to be believed in, *mediately*, by some sort of inverse probability argument, is not discussed in this paper.

might then be able to maintain that the particulars presented in sight and touch are *in fact* parts (in some sense) of physical objects; though even then, as Kant has shown,* we could only *know* that they are so by performing acts of "synthesis" in accordance with categories.

Sense-experience reveals to us a great multitude of particulars, or somethings, having such qualities as colour, shape, hardness, loudness, etc., and related by relations of similarity, difference, concomitance, and sequence: moreover, some of them come in complexes, within each of which (though not, so far as sense can show, between them) spatial relations reveal themselves. Each of these particulars reveals itself as a *this* such, or qualified somewhat (*τόδε τοίονδε*): and we may therefore say, if we like, that the mental act, by means of which they are revealed, is "judgement" and not mere acquaintance.† But this must not blind us to the distinction between a *Something* on the one hand, and a *Thing* on the other, between a particular and a substance. Every substance is a particular, but not every particular is a substance. And the revelation which we have by our senses, whether called judgement or not, does not show that these particulars endure beyond the period during which they reveal themselves to us (or are continued into like particulars beyond that period). Doubtless when we are aware of them, we are also as a rule "under an impression that" they do so endure: but being under an impression is precisely *not* knowing. Such knowledge, as we have said, comes not by direct revelation (whether this latter be called judgement or not) but by comparison and synthesis, if at all.

* Cf. the *Transcendental Deduction of the Categories*, especially the First Edition version.

† On the unfortunate implications of the term judgement and the confusions it leads to, cf. Cook Wilson, *op. cit.* Some other term is wanted, e.g., "apprehension of facts."

These somethings then, and these relations between them, are all that sense experience enables us to *know*. But we may reasonably infer, by ordinary inductive arguments, that other somethings of assignable kinds could have been revealed now or in the past under assignable conditions ; *e.g.*, that if I were now having the experience called sitting in front of my fire, I could have been seeing a white elongated something which I describe as a china owl on my mantelpiece. And further we may infer that other such somethings will be revealed under assignable conditions in the future. These sense-given somethings we shall in future speak of as *sense-data*, following Dr. Moore. And those somethings which could have been, but are not, revealed we shall call *possible sense-data*.

Now the question is, whether we need go any further ? Could a tenable account be given of the meaning of the statements of common sense and science, on the assumption that physical Nature consists of nothing more than these actual sense-data, which we certainly know to exist and to have existed, and the possible sense-data in whose possible existence we have good grounds for believing ? The attempt is at any rate well worth making, for its own sake : and even if it breaks down in the end, we shall be in a much better position to see what further assumptions are needed and why, when we have tried to set forth in detail what we know about sense-data and possibilities of sensation, and to make this knowledge go as far as it can.

The best known advocate of this view is, of course, Mill ; but his exposition of it is very far from adequate. When he defined Matter as " a permanent possibility of sensation " and again when he said that it consists of sensations and possibilities of sensation, he left out several important points. In the first place, he did not try to show how this vast mass of actual and possible sense-data is to be divided up into diverse *things* or *objects*, nor did he give any account of what a Thing or Object is. Evidently it must be the permanent possibility of a *certain set* of sensations. But what

kind of relations must subsist between them, or between the sense-data which are their contents, if they are to belong to such a set, or what kind of set it is, he does not say. Another important omission is that he gives no adequate account of the *spatial and temporal relations* between things or objects: yet he clearly cannot accept the ordinary account of these, if he rejects the ordinary account of what a Thing is. Thirdly, he gives no adequate justification of the belief that other minds exist, and that they perceive the same objects as I do.

It is very important to see whether these omissions can be made good. If they can (and we wish to maintain that they can), it will be possible to give at any rate an adequate *description* of the Perceptible World upon Mill's view. But of course the whole virtue of a theory of perception lies in its detailed answer to just those questions which Mill fails to deal with. Nor has any other philosopher attempted to deal with them quite from Mill's point of view.* And this is the more extraordinary, in that the traditional idealist view of perception and of matter seems to have been very like Mill's, although this has not always been openly avowed by idealists.† Indeed, one of the traditional *meanings* of the term "idealism" has been this very theory of perception and of matter. Accordingly, in what follows we shall often speak of it as "idealism." This usage may be objected to, but it has the advantage of shortness. Those who object may, if they like, read "positivism" instead: "pheno-

* Mr. Russell comes nearest to doing so. But his theory requires the existence of unperceived *sensibilia* and therefore differs in an important way from Mill's.

† Mill himself points out that his view is held by "all good Berkeleyans." And Kant's conception of an Empirical or Phenomenal object (distinguished both from the simple *Vorstellung* and from the Thing-in-itself) seems to be exactly the same as Mill's, though his account of the way in which we come to know each Object is of course different. Cf. also McTaggart, *Some Dogmas of Religion* and Heerlé *Studies in Contemporary Metaphysics*, Ch. 5.

menalism" will not do, for phenomenologists would not admit that such "subsistents" as Mill's possible sense-data are real in any sense at all. But Mill must maintain that they are real *in some sense*. For we can think of them, and they stand in relation to each other, and to the actual.

In this short paper, we cannot undertake to discuss all the points omitted by Mill. We shall confine ourselves to two: the nature of Things or Objects, and the nature of spatial relations: we shall neglect time altogether and treat the Objects as either "momentary" or "timeless." And our aim will be to show that Mill's theory can give a perfectly adequate account of both these points. We may begin with the conception of a Thing or Object. This is particularly important for our purpose, because some realist philosophers hold that the only characteristic common to all the sense-data which are said to belong to the same thing, and to no other sets of sense-data, is the following: that each of them stands in the relation "being an appearance of" to some single physical object in the ordinary realistic sense of the word "object," *i.e.*, to some substance having a closed boundary in space, a single position at any one date, etc. Thus, according to these philosophers, unless we are in some way aware *ab initio* of physical objects, in the ordinary realistic sense, we could not possibly make statements like "I am seeing the same thing as I saw just now" or "I am seeing the same thing as you are." And that, not because we could never know whether such statements were *true*,* but because we could not know what they *mean*. If so, Mill's attempt to re-define the term "physical object" breaks down at once, for his definition presupposes the truth of the view he is attacking.†

* We shall urge later that such statements can never be more than probable (*cf.* Reid, *Intellectual Powers*.)

† This objection, if true at all, holds not only against Mill, but against philosophers like Mr. Russell and the American New Realists, who believe in the existence of unsensed sensibilia.

The contention of these philosophers (which may take several forms) seems to be partly true and partly false. It does seem to be true that there is no one *direct* relation which holds between any two sense-data which are said to belong to the same thing, and does not hold between other pairs of sense-data of which this is not said. In Dr. Broad's terminology, the unity which we are here concerned with is a "unity of centre" not a "unity of system": that is, "A belongs to the same thing as B" is always analysable into "There is something X to which A has the relation R, and B has the relation R." But it does not seem to be true that this something is a physical object, in the ordinary realistic sense; nor that R is the relation "being an appearance of." For our knowledge of such objects, and of this relation must be immediate, if we have it at all. And we have seen that there is no reason to think we do have it. What, then, is this something?

Our answer is, it is something purely geometrical. Whenever we perceive, by sight or touch, a number of sense-data which are said to belong to the same thing, we notice the following fact. A certain three-dimensional figure can be conceived, such that the shape of every sense-datum in the set *either* exactly resembles *or* is a distortion of, part of the surface of that figure. The distortion may be quite slight, as when we look at a thing a little obliquely: or it may be very great, as when we look at it through uneven glass, or see it reflected in a polished spoon. Further, we may divide the whole set of visual and tactual sense-data into sub-sets, such that each of them has *one* member whose shape exactly resembles the shape of some part of our three-dimensional figure, while the *other* members can be arranged in a series, each item of which is "more distorted than" the one before, *i.e.*, differs from the first member more than the preceding item differed. Thus we have a series of increasing distortedness, which conducts us all the way from the "wildest"

appearance, seen by a semi-conscious observer through uneven glass in moonlight, to the "tamest" perspective view.

Moreover, there is one solid figure, and one only, which is the *common* matrix of all the sense-data in the set. Consider first a single surface of this solid figure. Let a flat circular plate be laid on the ground, for instance. As we walk about, "keeping an eye on it," we see a variety of elliptical and circular somethings. And it is plausible to say, why may we not regard the circles as distortions of the ellipses, instead of regarding the ellipses as distortions of the circle? And why choose one ellipse rather than another?

The answer is, that only the circle will do. Let us walk towards the plate on a line from East to West. We then see a series of ellipses, of gradually decreasing eccentricity, whose major axis lies North and South. The limit of this series is a circle, which we see when we are "standing right over the plate." Now let us walk towards the plate along another line, *e.g.*, from North to South. Here again we see a series of ellipses of gradually decreasing eccentricity, but this time they lie East and West. And here again the limit is a circle. And so it is, whichever way we walk towards the plate. On each new route our ellipses lie in a different direction, but the limit of each series of ellipses is the same circle. Thus, the circle is the common limit of an infinite number of series of elliptical appearances; and it is therefore right to say that they are distortions of it, not it of them. In any *single* series indeed (say, that seen on a walk from N.W. to S.E.) we may regard any member we like as the matrix, and make the other distortions of it: a matrix might as well be one of the ellipses, as the circle. But when we have a number of such series to consider, as we have here, only the circle will do: for it is the only common member of all the series.

Similar considerations apply to the other surfaces of the figure. Each of them likewise is the common limit, and the only common

limit of a number of distortion-series. And thus there is only one solid figure, of which all the sense-data in the set are either copies, or distortions.*

Let us call this solid figure the *Standard Figure*. And let us call the set of sense-data which are held together by their common relation to it, a *Family* of sense-data. The Standard Figure, we must repeat, is not anything actual: it is not an existent particular, nor a substance. It is a subsistent, not an existent, something "purely ideal," if we prefer that language. One reason why "Realism" seems so plausible both to plain man and to philosophers, whereas views like Mill's always have an air of paradox, is that we so easily slur over this distinction between existent and subsistent, actual and ideal. This confusion is no doubt assisted by the curious fact that the ideal standard figure is more familiar to the minds of most civilised men† than the actual appearance which it serves to unify. Unless we are artists or philosophers, the sense-datum, as Reid observes, "passes out of our mind as if it had never been," and the standard figure is all that we attend to. There seems to be three reasons for this. (1) The data of touch approximate very closely to the standard figure, and touch being the most practical of the senses

* The theory we have been expounding can be used to provide a classification of the various appearances of a single thing. Those which exactly resemble some part of the standard figure might be called *aspects*. Next we should have *perspective views*, and finally *distortions*. And we could make another division into *associated* and *dissociated* appearances, as Mr. J. E. Turner has suggested. The associated appearances of a thing could be those which are more or less in the same region of space, the dissociated those which are not (*e.g.*, images of refraction and reflection). We may note that when Locke said that the primary qualities of sense-data resemble the qualities of physical objects, he failed to draw two distinctions. 1. between aspects and other appearances: 2. between standard figures and physical objects.

† To make it so was, perhaps, the greatest achievement of those "Stone Age metaphysicians" of whom Mr. Russell tells us.

is the most interesting to practical men. (2) A vast multitude of actual and possible sense-data is very awkward to manipulate in thought, whereas a standard figure is very easy. (3) Moreover any conclusions we reach by examination of standard figures, and their relations can easily be translated back again into actual and possible sense-data, our own or other people's. Until recently physical science concerned itself almost entirely with standard figures. (Cf. also the use which architects and engineers make of drawings and tangible models.)

Could we then define a Thing as a family of actual and possible sense-data? Clearly not. There might, as we say, be several things which looked exactly alike. For instance, there might be two exactly similar tobacco tins. There would then be two similar sets of sense-data, actual and possible: and we could form a family (as above defined) by taking some members of the one set, and some of the other. But such a family would certainly not have the characteristics required of a single object or thing, for some members of it might be best; some in South America, for instance. Yet it is a fact of experience, which any theory must make room for, that we can sometimes distinguish between two things which look exactly alike, although we are often deceived by such resemblances. How are we to amend our definition, so as to meet this difficulty? The obvious answer is, you must mention the place in which the sense-data are, and the date at which they exist. We should then have to amend our definition somewhat as follows: A Thing is a family of actual and possible sense-data which are all within one determinate region of space,* or continuous series of regions (to allow for movement), and which together occupy or could occupy (as the case may be) one continuous period of time.

* How the region of space is determined we shall see as we go along.

Two questions at once arise : What can be meant by " being in one region of space " or " one period of time " on the theory before us ? And secondly, if we know what is *meant* by these words, how can we tell whether any two sense-data *are in fact* in the relation thus described ? (The second question, we must note, arises on any theory of perception. Naïve Realism, no less than Idealism, is bound to give an answer to it ; and both have omitted to do so.)

This is enough to show that the three conceptions, unity of Thing, sameness of Place, and sameness of Date, are closely bound up with one another, and that the first has to be derived from the other two. This seems to have been overlooked by Mr. Russell, who seeks to derive sameness of place and of date from sameness of things, and thereby (as Dr. Moore shows) is unable to distinguish between two things which are exactly alike but in different places, or at different times.

Let us consider Place first. How, on Mill's view, are we to analyse statements such as " What I see now is in the same place as what I saw five minutes ago ? " We are not at present raising the question whether we can ever be certain of the *truth* of such statements as this* ; we are only asking what they mean.

The data which we have at our disposal for answering this question are a great number and variety of extended *sense-fields* (as Dr. Broad calls them), both visual and tactual. By a sense-field we mean the complex of sense-data of one sense presented in one " specious present." We also have good grounds for believing that a vastly greater number could be or could have been sensed, though never actually sensed. Let us begin by assuming that these extended sense-fields are discrete, *i.e.*, that between any two of them there intervenes either a non-

* We shall find that we can never be *certain* of it.

extended sense-field or some non-sensuous experience, such as an act of thought or imagination. This assumption is not strictly true. We quite frequently sense a continuous series of extended sense-fields extending over some considerable period. But these extend over periods of very varying length, and they are separated from one another by shutting of the eyes, by wanderings of attention, and by periods of unconsciousness, as in sleep. It is therefore simpler to assume that *all* extended sense-fields are discrete, since it is certain that there is a great deal of discreteness in our experience of the extended. We can correct this assumption afterwards. On the other hand, we do not need to assume that any extended sense-field is momentary; we will suppose that each endures through one specious present.

With such data can we give any account of what the plain man calls space and of what he calls regions of space? Of course, we should have *spaces*. Each visual or tactual sense-field is or fills a space; it is an extended manifold in which certain indefinable relations subsist, such as inside and outside, between, above, and the like. Each extended sense-field, then, is a spatial pattern. But the question is whether these many spaces can be co-ordinated into one all-embracing space, and the many patterns into a single pattern.

Here we may appeal to Mr. Russell. According to him, the following propositions must be true of all sense-data which belong to the same "momentary thing": (1) They must be similar. (2) They must be similarly related to the other sense-data in their several perspectives (i.e. sense-fields). What the first kind of similarity is we have already explained, though Mr. Russell leaves the question rather obscure. What of the similarity of relation? Clearly, if A_1 and A_2 both belong to the same thing, it is not necessary that A_1 should have exactly the *same* position in its sense-field as A_2 has in *its* sense-fields; e.g., that if A_1 is in the middle of the one, A_2 need not be in the

middle of the other. For on one occasion I may "look at the thing out of the tail of my eye"; on another I may gaze directly at it. A_1 would then be at the extreme edge of its sense-field, and A_2 full in the middle. Nor need the backgrounds be at all similar. To take Dr. Moore's example, we sometimes see the moon among tree-trunks, sometimes in a clear blue sky; yet we do not doubt that those two sense-data, which are related in unlike ways to unlike backgrounds, belong to the same thing.

We notice, however, that the very same objection has been brought against Mr. Russell's first criterion, as against this one. It is urged by Dr. Moore that the sense-datum which I sense when I look at Ely Cathedral from a few yards away is very different indeed from the sense datum seen when one looks at the same object (as we say) from a distant hill. We have tried to show, however, that there really is a relation which subsists between any pair of sense-data which belong to the same thing, viz., the relation of "belonging to the same family" or "having the same standard figure"; and this, we suggest, is what Mr. Russell must really have meant by similarity. Can we deal with his "similarity of relation" in the same way?

It seems so at first sight. It seems that we should only have to apply the same treatment to sets of sense-data* as we have before applied to single sense-data. Every extended sense-datum is a member of some patterned complex of sense-data, which are sensibly simultaneous with it. Let us call our sensa A_1 A_2 A_3 , and the several complexes, in which they respectively occur, C_1 , C_2 , C_3 . Then, it may be suggested, if A_1 , A_2 , and A_3

* Not to sense-fields as wholes, for they often include too much. *e.g.*, the field containing C_1 might contain an appearance of a distant mountain. C_2 's field an appearance of the sun. C_3 's of the moon. But there might be no sense-datum of the mountain in C_2 's field, or C_3 's.

belong to the same thing, two conditions must be fulfilled: (1) A_1 , A_2 and A_3 must belong to the same family; (2) there must be a three-dimensional pattern, such that the pattern of C_1 and the pattern of C_2 and the pattern of C_3 are either distortions of it, or parts of it.

Let the following represent the three sense-fields.*

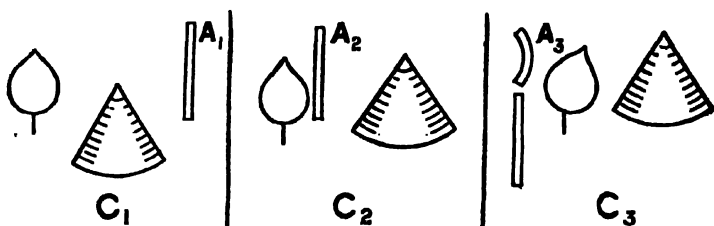


Fig. 1.

These three patterns are all either distortions or parts of a pattern consisting of three upright solid figures, whose bases are arranged in a triangle. Of this pattern Fig. 2 represents the plan form.

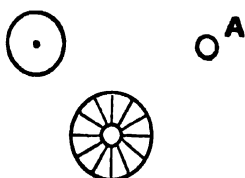


Fig. 2.

Each of the three patterns contains a sensum of the kind A; and the three A's are all distortions or parts of the same standard figure, which in this case is a thin cylinder. By this means, it may be suggested,

we can avoid the original difficulty that there may be two or more things which look exactly alike. For we can now substitute a more precise statement for the vague statement that sense-data which belong to the same thing must be in the same region of space. This will simply mean that each such sense-datum is given along with other extended sense-data which form together

* C_3 is supposed to be seen through uneven glass.

with it a patterned complex and that the pattern of these complexes are either distortions or parts of a single three-dimensional pattern. (We have assumed for simplicity that the sense-data do not belong to what we call a moving thing. If they do, there will not be *one* three-dimensional pattern but a continuous series of similar patterns; and there will not be one set of patterned complexes, but a series of sets.)

Before we go on to reflect upon this suggested procedure, and to amend it if necessary, it will be well to pause and consider more narrowly the results to which it claims to bring us. And first we must notice that if this is what is *meant* by "being in the same region of space as so and so," the word region must have two very different meanings; and so must the word space. The ordinary meaning of the word region is fairly obvious. When two sense-data in the same sense-field adjoin each other, or both adjoin the same sense-datum, we say that they are in the same region. But according to the view we are examining, sense-data from two different sense-fields cannot in this literal sense adjoin each other; at least, there is no evidence to show that they can. The only spaces that we know to exist are the spaces of the several sense-fields; and there is no more reason for thinking that they are all parts of a wider all-embracing space in the literal and sense-given sense of "parts," than there is for thinking that the spaces of two dreams are so. There is a *system*, no doubt, of which they are all members; and this system will have some of the characteristics which the all-embracing space of common-sense is supposed to have, but not by any means all. And there is also the single three-dimensional pattern, in which the standard figures have their positions. That is much more like a region of space as common-sense conceives it, just as the standard figures (so far as shape goes) are exactly like the things of common-sense. But this *standard pattern*, if we may call it so, like the standard figures which have their

positions in it, is not anything actual at all, so far as we know. It is something conceived of, something merely "ideal." It subsists; it does not exist as the spaces of actual sense-fields do. There *may*, indeed, be an actual space which has the characteristics that this standard pattern has; but so far, we have found no reason to think so, and certainly we can correlate our sense-data without any such assumption. It follows that the only relation between the standard pattern and one of the sense-given patterns which we compare with it is, that there is a part of the one which *resembles* (more or less nearly) the whole of the other. There is no *spatial* relation between them. The standard pattern does not enclose the sense-given patterns; it is not near them or far from them, above them or below them. It has the kind of relation to them which the spatial pattern of yesterday's dream may have to the spatial pattern of to-day's, no more. Moreover, when two sense-data are said to belong to the same thing, they do not themselves have positions in the standard pattern. It is those parts of the thing's standard figure to which they severally approximate that have such positions. Take, for instance, the experiences which we call looking at the front and the back of a piece of card. Here there are two white sense-data from two different sense-fields, one parallelogram-shaped (say) and one trapeziform. By the procedure described we find that they belong to the same thing. But this does not mean that they themselves are close together; it means that there is a solid standard figure of rectangular plan-form, and that the one sense-datum is a distortion of one of its sides; the other is a distortion of the other. And when we say "is a distortion of," we simply mean "resembles in certain ways, and differs in certain ways!"

Thus, the result before us is not likely to satisfy common-sense. When the theory says that two sense-data from two different sense-fields are in the same region, it means that they

are both included in the same portion of the system or order of sensible spaces ; which, however, is not a space in the literal sense, and does not literally contain regions. And there is also the standard pattern ; this is a space in the literal sense and does contain regions, but there is no reason to think it actually exists, and the entities which have position in it are not the *sense-data* that we started with (neither actual nor possible), but those standard figures and parts of standard figures to which the *sensa* severally approximate. On these grounds it may be held we should do better to give up the ordinary phraseology we started with, and say that *sense-data* from different *sense-fields cannot* be in the same region of space : but that there is some *other* relation which subsists between all the *sense-data* which belong to the same thing, and not between those which belong to different things : that of having a standard figure not merely of the same shape, but also situated in the same region of the standard pattern. And it is *this* relation, it may be said, which we were confusedly aware of, when we said that two *sense-data* belonging to the same thing must themselves be in the same region, but we failed to express it accurately, because we had not shaken ourselves free from the assumptions of common-sense. Moreover, it would be said, the two relations are closely connected. For any two *sense-data* whose standard figure has the same shape and the same place in the standard pattern should be said by common-sense to be in the same region. The presence of the relation which we have defined is taken by common-sense to be a sign of the presence of *its* relation.

To this plea we may answer : there is no question about the facts, but only about what we may call linguistic tactics. So far as the facts go, there is no reason whatever to think that common-sense is right. The only relation which really does subsist in the case under consideration is the one which we have

defined. And why should we be debarred from using ordinary language because we reject the ordinary analysis of its meaning? Common-sense will never be satisfied, so why try to satisfy it?

We must notice, however, that these two unsatisfying entities—the ordered set of spaces which is not itself a region of space, and the standard pattern which is a space, but is not actual—are very intimately connected. For the ordered set of spaces is only ordered by reference to the standard pattern; it is, as it were, a set of inaccurate and partial copies of this, only held together by their common relationship to their ideal original, much as in the philosophy of Plato the various imperfectly just acts are held together by the fact that they all “intimate” the form of perfect justice. (In the same way, what we have been calling a family of sensa is only held together by the fact that all its members “imitate” a common standard figure.)

But this idealistic theory of space and of objects, as we have stated it, is not yet quite adequate. The weakness of it is, that (as we say) the world is too large. Our sense-fields embrace so very little. It is true that by initiating suitable kinaesthetic experiences we can often get appearances* of two things into one sense-field, when previously we could only get them in two separate sense-fields. For instance, by going up New College Tower I can see a sense-field in which an appearance of New College Lane and an appearance of Trinity College are both included; whereas I cannot ordinarily get them into a single sense-field, nor even into two successive ones. But there is a limit to this process. If a sense-field includes sense-data belonging to an unusually great number of things, those

* We use the phrase “appearance of” as equivalent to “sense-datum belonging to.” “A is an appearance of so and so” means, *inter alia*, “A belongs to such and such a family.” What more it means we are now trying to determine.

sense-data are unusually small and dim; and this makes it difficult to be sure whether a given sense-datum belongs to this thing or to that. For many things which look quite different when we are near them, look alike when they are a long way off. (Families of sense-data whose large and vivid members are strikingly different, often have small and dim members which are very similar indeed.) Moreover, what we call obstacles, intervene. We often find that we cannot see an appearance of a given thing, when we might have expected to, because an appearance of some other thing is in that section of the visual field, and has a smaller visual depth. Thus, even if this process of getting more and more things into our visual field could be continued further than it can in fact, the dimness and smallness of the resulting sense-data would make it almost useless. And, in fact, owing to obstacles, it can only be continued for a short way.

This unavoidable "narrowness" of our sense-fields leads to the following difficulty. There may be cases when the sense-data A_1 and A_2 belong to the same family and the complexes C_1 and C_2 in which they are severally included may have the kind of indirect similarity of pattern to which we have alluded, and yet A_1 and A_2 may not belong to the same thing, but only to two similar things; and likewise C_1 and C_2 may belong not to the same region, but only to two similarly ordered regions. For as common-sense would put it, the "surroundings" of C_1 may be quite different from the surroundings of C_2 . By this common-sense means that there is a wider complex Cw_1 of sense-data which includes C_1 as a part, and another wider complex Cw_2 which includes C_2 as a part, and that the remaining members of Cw_1 have not the slightest correlation with the remaining members of Cw_2 .

Now, of course, we cannot accept common-sense's way of putting this. For it presupposes that there can be actual sense-

data (or entities which are exactly like them) which exist when they are not being sensed ; and, moreover, that unsensed particulars have the same kind of spatial relations to sensed ones, as sensed ones in the same sense-field have to one another. This is implied by speaking of "surroundings." But there must be some tenable way in which this statement of common-sense can be interpreted by the theory before us. For in those cases when common-sense says "the surroundings of what you see now are wholly different from the surroundings of what you saw this morning, although the scenes themselves look exactly alike," we always find that our subsequent experiences differ in a characteristic way from those which we have, when the surroundings are said to be the same.

Suppose, for instance, that there are, in fact, two square lawns, each with a fig tree in the middle of it, and each surrounded by a brick wall ten feet high. When we enter either, we shall see a patterned complex of sense-data. Thus, upon a theory before us, there exist in fact, two similar sets of patterned complexes, actual and possible. But how are we to know this ? How are we to know whether there is one such set, or two, or several ? For the observed and observable complexes, all belong *ex hypothesi* to the same family.

There are two ways out of this difficulty. One way is, to bring in what Professor Alexander calls an "angelic view." Imagine an observer of infinite visual powers. Let him be endowed with the power of seeing through or round "obstacles" ; let his field of vision not be bounded at the sides, as ours are ; let his visual acuity be infinite, so that he can distinguish the shapes and colours of sense-data, however distant and however small they may be. He will then be able to survey the whole of Nature at once ; *i.e.*, at each moment he will be able to sense a sense-field containing all the sense-data which could exist at

that moment in a single sense-field.* Now, if there really are two lawns, a single sense-field of his will contain *two* complexes of sense-data, *both* belonging to the same family as the complexes which we mortals perceive when we enter either of the gardens. And these two complexes will, of course, have different places in the sensible pattern of his sense-field, *i.e.*, will have, if we like to say so, different "surroundings." But if there is only one lawn, the angelic sense-field will contain only one such complex.

This enables us to give some account not merely of a region of space, but of space as a whole. If we collect together a number of sense-fields which such an angelic observer either does or could sense, we shall find that each of them has its characteristic pattern; that all these patterns are distortions or parts of a single three-dimensional pattern; and that all the sense-data composing them are distortions or parts of a single set of standard figures. That in which this three-dimensional pattern is spread out will be a space corresponding exactly to what common-sense understands by Space with a big S: and the patterned manifold of standard figures will correspond to what common-sense understands by the physical universe.

Only we must remember that upon the idealistic theory this Space and this physical universe are, so to speak, doubly removed from the real world. The angelic views by means of which it is "constructed" are themselves only ideal; and, further, the pattern embracing all the standard figures is only "imitated" by the angelic views—it is not identical with any one of them, nor with the whole of them taken together. (It is true that in virtue of their relationship to this common standard pattern, all the angelic and other sense-fields can be ordered in a single system,

* We must not say, containing an appearance of every *object* that exist at that moment: for this would be circular.

and that without it they could not be. Still, this system is an *order of spaces*, not a *single space*.*) And yet this doubly ideal three-dimensional pattern is in part at least very familiar to us, more familiar perhaps than the patterns of our own sense-fields, out of which it has been in this devious way extracted, and certainly much more familiar than the non-spatial order in which sense-fields are arranged. For every *map* displays a section of some part of it. And when we discuss the spatial relations of places and things, it is of this angelic or, rather, super-angelic pattern that we habitually think. The fact that we all use maps and plans, and that we trust them sometimes, even against the evidence of our senses (*e.g.*, when we see a mirage), might naturally seem to be a standing argument in favour of Realism. For a Realist would say: "You trust the map, because it portrays the shapes and the spatial relations of those physical objects upon which your sense-data ultimately depend." (The same argument, of course, applies to side and end elevations of machines, buildings, etc., as well as to plan-views.) We now see what answer an idealist could make to this attack. If we know the shapes of the standard figures to which our present sense-data approximate, and if we know how these standard figures are related to one another, and to other standard figures, in the standard pattern; then (but not otherwise) we can predict what sense-data we or others shall sense upon initiating this or that series of kinaesthetic experiences. And thus we are able "to find our way about," as we say. But if we were ignorant of standard figures and of the standard pattern, if we knew only the actual and possible sense-fields, we should be completely bewildered by their number and complexity, and should be quite at a loss how to act, or what to expect next.

The development of the idealistic theory has now reached the

* This system is what Mr. Russell calls *Physical or Perspective Space*.

following point. We wished to define a thing or object. We could not define it as a family of actual and possible sense-data, for a family's members might be taken from a number of things existing in different places and at different times. The obvious expedient was, to say that a thing consists at any moment of a number of actual and possible sense-data all belonging to the same family and situated in the same place. But the question was, could we give an adequate idealistic translation of the phrase "in the same place"? We have now found that we can.

We answer it by taking into account not merely the shapes of the sense-data themselves, but also the shapes or patterns of the sense-fields of which they form part. These sense-fields which embrace a great number of sense-data, *i.e.*, those in which the data that we are inquiring about are "surrounded by" a great number of others, turn out to be the most important. And the angelic sense-fields, which embrace the maximum number of sense-data, or the widest possible "surroundings," are the most important of all.

We can now amend our definition thus : A set of contemporary visual or tactual sense-data (actual and possible) are said to belong to the same thing when, and only when, the following conditions are fulfilled : 1. All belong to the same family. 2. No two of them exist in the same sense-field, even when the sense-field is enlarged to "angelic" dimensions. 3. The pattern of the sense-fields in which they occur are all distortions or portions of a single standard pattern.

If these conditions are fulfilled, it will follow that the several places of these sense-data in their several sense-fields all *correspond* to a single place in the standard pattern, which place (since the sense-data are all of the same family) will be occupied by a single standard figure. But if we consider not the ideal standard pattern but the real manifold or arrangement in which Nature

(on this theory) is ordered, we find not correspondence, but identity. If we can speak of "places" in this manifold, which we can only do in a metaphorical sense, then all these sense-data are in the *same* place. And so our original suggestion, that an object is a set of sense-data of the same family existing in the same place, may stand.

This, then, is the *meaning* of the phrase "in the same place as" upon the theory that we are considering. But another question now arises: could we ever discover that whether a number of sense-data do *in fact* have the characteristics required? It is important to see that these two questions, "What does same place mean?" and "Are A and B in fact in the same place?" are utterly different.

We shall have to admit that we can never be perfectly certain that two or more sense-data are in the same place, though we can form the opinion that they are, and this opinion may become more and more probable. On the other hand, we can be perfectly certain that two or more sense-data are *not* in the same place.* Let there be two sense-data A_1 and A_2 : call their respective sense-fields S_1 and S_2 . Let A_1 and A_2 belong to the same family in respect of their shape, and S_1 and S_2 in respect of their pattern. Now, if we can find a third sense-field S_3 containing *two* members of the A family part of whose pattern is of the same family as S_1 , and part as S_2 : then we can be certain that A_1 and A_2 are *not* in the same place. We can also tell how far apart they are.

But in order to be certain that A_1 and A_2 are in the same place, we should have to inspect a number of angelic sense-fields: and we should have to know that no angelic sense-field contained

* Cf. the Inductive Methods of Mill: by which we can be certain that A is *not* the cause of B, but we cannot be certain that a (say) is its cause.

more than one A ; that all these sense-fields, angelic and non-angelic, are distortions or portions of a single standard pattern, and what pattern this is. But obviously such knowledge is impossible to us : we are not angels, and our sense-fields contain very little. Nor have we time or opportunity to examine more than a few sense-fields, and compare their constituents and their patterns.

What then is to be done ? We must manage as best we can. In most cases we content ourselves with comparing just one or two sense-fields. If I wish to find out " whether this house I see now is the same as the one I saw yesterday " (as common-sense would put it), *i.e.*, whether two elongated reddish sense-data belong to the same object, I first compare the sense-data themselves and find out whether they could belong to the same family. If they could not : if one, for instance, has a dome-like top, and one a spiky top ; then the question is settled at once. It cannot be the same house. But if they could belong to the same family, the one (say) as a side view, the other as a front view, then I set to work to compare the patterns of the sense-fields. If they could not possibly be of the same family --if in the one case our reddish appearance is surrounded by elongated green appearances, which we call views of trees, while the other reddish appearance stands alone in the midst of an open landscape--then the question again is settled. But if the two sense-fields could be of the same family, if these two patterns could be regarded as two distortions of a common three-dimensional pattern, then we should usually decide that the object *was* the same in both cases.

But plainly this would be nothing but an opinion, which might quite easily be false. We might, indeed, seek to verify it in various ways, *e.g.*, by going into the house, and looking at the inhabitants, or inspecting the view from the attic window. But after all verification is not proof : to suppose it is, is to commit

the fallacy of the consequent ; and that, no matter how many different and independent verifications our proposition may receive.* If the house was the same, we should experience A B, C, etc. ; we do experience A, B, C, etc., but it does not follow that the house *is* the same. How do we know, for instance, that we have not been transported to another planet during the night, containing houses and gardens and inhabitants very like those of the earth ? To answer : " there is no known physical process which could take us there " is to beg the question. For if we are to know anything of physical objects and their processes, we must first be able to know that two successive observations are observations of the same object, and whether we are able to know this, is the very question at issue. If it is only probable and not certain that A_1 and A_2 are appearances of the same object, then the laws of physics are only probable and not certain. I cannot even be certain that I have the same body as I had before I went to sleep last night.

However, these uncertainties are no objection to the idealistic theory. For they arise on any theory of the external world. Even a Naïve Realist cannot be *certain* that two sense-data are parts of the surface of the same object. In this matter, we are all in the same boat. We must find what comfort we can in Bishop Butler's remark, that " Probability is the guide of life." We must also remember that we should not even be able to raise these difficulties if we were not certain of two things†: (1) Of the meaning of the question " Are A_1 and A_2 appearances of the same object." (2) Of our own personal identity.

* A point which seems to be overlooked by some supporters of the " coherence theory " of truth.

† We may *know* the meaning of the question, without being able to *analyse* it ; cf. Dr. G. E. Moore's article in *Contemporary British Philosophy*, Vol. 2.

A similar account must be given of the spatial relations between different objects. It is easy to see what we *mean*, upon the idealistic theory, when we say that three objects *a*, *b* and *c*, lie upon the arc of a circle. This statement, as we have seen, can only be understood in a Pickwickian sense; for though the perceptible world has a determinate order and arrangement, its order on the theory before us is not spatial in the literal sense of the word. The statement must mean that the corresponding standard figures lie upon the arc of a circle in the ideal space of the standard pattern. The *meaning* then is plain: but here again we can be certain that such statements are false, but we can never be *certain* that they are true. We are faced by two difficulties, though those again affect all theories of the external world alike.

1. Even when the objects are, as we say, very close together so that we can see them all in one glance, we cannot be certain what these spatial relations are. For though the pattern of a certain sense-field may be a portion of the standard pattern, it may be a distortion of it, more or less great. One view, then, is never enough: nor is any number of views enough. Here the converse holds of what held before: we can be certain in some cases that a given sense-field is a distorted one, *i.e.*, that perspective has affected it, or that some refractive or reflective agency is at work, but we cannot be certain that, given sense-field is *not* distorted, *i.e.*, that no such agency is at work. In practice, of course, we come to know that under certain conditions (*e.g.*, when we are looking obliquely or where a prism is present) there *is* distortion. And when such conditions are not observed to be present, we assume there is no distortion, that the pattern of the view before us is a portion of the standard pattern, and that the relations of the standard figures can therefore be read off from it. On that assumption we "construct" our conception of physical space (if it can be called

space) and of the objects in it, and we persist in the assumption until we are proved wrong.

2. When the objects are (as we say) a long way apart, or when they are close together but separated by opaque obstacles, there are other difficulties as well. We try, if we can, to obtain a new and wider sense-field in which appearances of all our objects are included, *e.g.*, by going up a ladder or a hill, or by taking a side view. Even if we succeed in doing this, the difficulty mentioned under head (1) still remains. But if we do not, we have to have recourse to an indirect method of gradual overlapping. If *a* and *b* are two objects (in different rooms of a house, suppose) we find a sense-field which includes, say, *p* as well as *a*, and from it establish, subject to the doubts under head (1), the spatial relation of *a* to *p*. We then go on in the same way, until we find some object *x*, which appears in the same sense-field as *b*. Obviously, the chances of error increase with every step.

In this manner, and subject to these doubts, it would be theoretically possible for an idealist to "construct" the spatial or quasi-spatial relations of all the perceptible objects known to us. And the order or system of perceptible objects thus "constructed" might be called the perceptible world. This system is all that corresponds, on the idealist view, to what common-sense calls the physical world - for the manifold of standard figures, however much they resemble common-sense objects in shape and position, is not a world of actual existents.

It is obvious that these two conceptions, the perceptible world and the physical world, are very different. We have already noticed the great difference there is between them in respect of Space and spatial relations. We have now to notice another. According to common-sense, all the things which make up the contents of the world at one moment are coexistent, and so are the constituents of those things. If they were not, it holds, they could not stand in spatial relations, or make up a

world at all. But according to the idealist view, the things indeed are coexistent (in a sense), but the vastly greater majority of their constituents are not. For we can only sense appearances of a very few things at any one moment, and only a very few appearances of those few things. And as unsensed sense-data are not known to exist, all the other constituents of those things, and all the constituents of all other things, are only possible, not actual; *i.e.*, I could have been sensing them, if I had previously chosen to initiate suitable kinæsthetic experiences. In what sense then are the things coexistent? Only in a Pickwickian sense. One of *a*'s actual constituents, for instance, is simultaneous with all *a*'s other possible constituents, and with the possible constituents of other objects *b, c, d* This means that I could now have been sensing A_2 or A_3 or A_4 etc. instead of A_1 . Again, I could have been sensing B_1 or B_2 or B_3 or again, C_1 or C_2 or C_3 or again, D_1 or D_2 or D_3 , instead of A_1 , which I actually am sensing. Thus the perceptible world at any one moment, upon this view of it, is nothing but an order of simultaneous alternative possibilities of sensation; many of the possible sensations would, of course, have *extended* sense-fields for their contents.

This view of the perceptible world is certainly a curious one. But so long as we know just what the alternative possibilities are, and what their order is, there is nothing inadmissible or absurd about it. And that we can know this much, by the help of the notions of standard figures and of ideal space, we have tried to show. Certainly this view is very different from that which common-sense is supposed to hold. But perhaps this difference is apt to be exaggerated. We are all aware that when we put ourselves into a common-sense state of mind it is extraordinarily difficult to know what we do or do not think about such questions as these. Can we be quite certain that we regard the three-dimensional space, and the extended entities of it, which are then

before our minds, as *actual*? If not, the difference almost disappears; for as we have seen, an idealist cannot discover the order of the world without the help of an *ideal* space and ideal standard figures. But the truth seems to be that in our common-sense state of mind we do not even raise the question whether they are actual or ideal, we simply "entertain the thought of them." In that state of mind practical guidance is all we look for; and this we have, whether space and its occupants, as common-sense conceives them, be real or not. The same results will follow whether there is a world of common-sense physical objects, or only sets of actual and possible extended sense-fields systematically ordered.

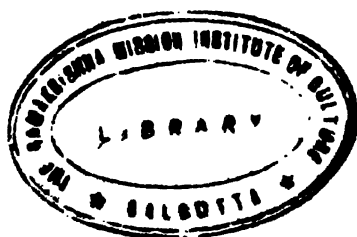
Further, whatever theory of perception we may hold, it must be admitted that we do have this knowledge of alternative possibilities of sensation; and if we have other knowledge as well—*e.g.*, about physical objects—at least it is *derived* from this knowledge in some way. For no one would claim to have an intuitive, non-sensuous knowledge of electrons and protons (or whatever physical objects he believes in); and sense-data of which we do have intuitive knowledge are not parts of physical objects. Thus, even if we disagree with the negative part of the idealistic theory, its refusal to admit that anything exists except sense-data and possibilities of sensation, at least we must agree with its positive part. Its positive part is an essential element in any tenable theory of perception, and an indispensable preliminary to any further step.

Nor is it obvious that any further step need be taken. Mill's view, it may plausibly be urged, will serve all the purposes of common-sense and of science. It may even claim to be "realistic," if this word comforts anybody. For it holds that *all* our sense-data are in a certain sense "parts of" objects, and that *all* the qualities of them, primary and secondary (and why not "tertiary" too?), "belong" in a sense to objects. And the whole of

physical Nature, the unperceived parts no less than the perceived, can be described in terms of it. The unperceived parts, too, have a certain "reality," though not the same kind as the perceived parts; they subsist, and, what is more important, they stand in determinate and knowable relations to the perceived. If Mill's theory is to be attacked, the critic must take other ground; he must ask, What account can Mill give of causal laws? Can Mill admit, for instance, that every actual event is caused by some other actual event? Can we say that A is the cause of B, when B occurs even though A does not actually happen, but remains merely "possible"? And if we are to give up the law of causation, as ordinarily understood, what are we to put in its place? But even if Mill is unable to meet this objection (and it is by no means clear that he is), the positive part of his theory still retains its value as an account or description of the contents of the perceptible world, and of the relations which subsist between them.

Note.—It may be worth while to ask whether on this view (or how far) our knowledge of space is a priori, meaning by space that mode of order which the system of alternative possibilities of sensation displays? The answer is: some elements in our knowledge of it are a priori, and some are not. What is a priori (*i.e.*, not "given") is the notion of order or series, and the notion of possibility. What are "given" are the spaces or spatial patterns of the various extended sense-fields. If these had not differed from each other in a systematic way, if they had been either completely alike or utterly unlike, we could not possibly have discovered the connections between them, and we should have had no idea of an all-embracing spatial order, but only of a chaotic series of spaces. Nor should we have had any idea of a world. The conception of ideal space, as we have called it, does not seem to be a priori: the conception of a three-

dimensional space, and of the various possible kinds of shapes and relations in it, could be arrived at by the observation and comparison of a number of extended sense-fields, particularly tactual ones; for tactual sense-data often occupy the whole surface of a volume at once, whereas visual data never do this.



*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on February 14th, 1927, at 8 p.m.*

VII.—A CONCEPT OF THE ORGANISM, EMERGENT AND RESULTANT.

By C. LLOYD MORGAN.

I.

A GOOD many thoughtful people are rather weary of seemingly interminable disputes as to what we mean, or should mean, by sundry 'isms—such as naturalism, mechanism, vitalism. In controversial discussion it sometimes seems that when one or other of these words has been pronounced with suitable intonation, nothing more need be added—though, of course, it must be repeated again and again with increasing emphasis and more piquant intonation, in such phrases as "obsessed by vitalistic prejudice," on the one hand, or "still under the sway of mechanistic dogma," on the other hand. Hence not a few harbour suspicions that the unending controversy turns largely on something other than the factual evidence to be adduced. So often do they find the words "mechanism," "vitalism," "naturalism": used as words of emotional appeal from the pulpit to those who are right-minded in the congregation, that they doubt their validity as contributory to scientific argument. And they say: "If this be so—and to us it seems to be so—why not drop these words or relegate them, at least for a while, to cold storage? Cannot you help us to see the facts, or what you regard as facts, and the generalizations you base on these facts, from a fresh angle, even if this entail fresh nuances of verbal expression? Never mind if some of the words you use carry meanings rather different from those to which we

are accustomed. That matters little. In that we have already received some salutary training at the hands of exponents of relativity. Let not that deter you, so long as it helps us to get clear sight of that world-view which presumably you want us to envisage."

In response to some such tacit appeal Professor Whitehead asks us to consider, at large and in detail, *An Organic Theory of Nature*. I, for one, welcome this comprehensive name for an interpretation which is in line with, and carries further, much that is distinctive of a well-marked trend of contemporary discussion. This I may do without subscribing to all the articles of the philosophical creed Mr. Whitehead develops in his Lowell Lectures on *Science and the Modern World*. Even where I fully agree with him I shall follow his lead with faltering and less sure tread. And if, perchance, in thought or in verbal expression, I venture to take a line of my own, I trust that none of my heresies will be imputed to him.

What, then, are we to understand by an organic theory of nature? This, first: that in it all kinds and modes of action and reaction, all kinds and modes of relation and co-relation, all types and sub-types of natural entities, are to have place. To this end one invites those whom it may interest to enlarge and extend the currently restricted meaning of the word "organic" and of the word "organism." In what I have elsewhere written I lacked the boldness to do so. But under able leadership one gains courage.

Our chief concern here and now is with the widened concept of organism. I have been wont to speak of natural entities - with some misgiving as to the appropriateness of this expression. An atom is such a natural entity; so is a molecule and a crystal; so is an amoeba, an oak tree, a man. In a catholic sense so, too, is any social group of which certain characterizing features may be predicated. I have been wont to emphasise a salient feature

in any natural entity---namely, that what I speak of as the constituent items of its stuff go together in substantial unity on a determinate plan which characterizes each type of emergent entity according to its status in a natural hierarchy. In principle this salient feature is common to all such entities at all stages or studia of advance. And recently I ventured to assert that it is untrue to say that this kind of relatedness of parts within a whole affords a criterion that serves to distinguish a living organism from all lower natural entities.*

Now, if this be a feature common to all emergent wholes which have this type of organization, it is well to have a common name for any such whole. Mr. Whitehead suggests that the word "organism" shall be used with such a common meaning. Following his lead, I shall use this word whenever what I have called the items of stuff are in such relations to each other, severally and collectively, as to give to the organism what I still speak of as substantial unity. Within such an organism each part is what it is, not only in its own peculiar right, but also in virtue of its relation to all other parts within the unitary whole. An organic theory of nature lays stress on this cardinal character common to all organisms (not only living organisms), each having substantial unity according to its status.

If this extended use of the words "organism" and "organic" give pause to thought, so much the better. Some will object that it purports to annul the distinction between the living organism and the physical atom, on the one hand, and, on the other hand, that which is characterized by social organisation. But the adjectival qualifications remain unaffected, and still serve to mark such distinctions as we find. What we seem to need is a set of nouns which shall serve to indicate what is common to all instances of a general type of integral relatedness throughout

* *Life Mind and Spirit*, p. 66.

nature, and appropriate qualifying adjectives which shall serve to indicate the differentiating features in the several instances which stand at different levels. This would enable us to distinguish likeness in *kind* from diversity in *mode*, as I use these words. Organisms, in the catholic sense, are alike in kind ; but physical, living, and social organisms differ in modal status. There is modally more in a living organism than any not-living organism discloses ; but in that living organism, as such, there is modally less than is disclosed in the social organism.

As things are, one has in some way to give expression to that which is common in kind in words which are current in the usage of modality. Under such usage the words "organism" and "organic" are earmarked by biologists for plants and animals. They may well resent any broadening of meaning in the interests of a more general interpretation of nature. This must be faced. Furthermore, if one elects to speak in lower level terms say, in terms of items of "stuff" which go together in unity of "substance" it may be alleged that one seeks to interpret everything in physical fashion only. And if, on the other hand, one uses higher level terms introducing, perhaps, the word "purposive" with its distinctively mental implication forthwith one is charged with dramatizing in anthropomorphic wise. In the former case one uses modal words at more than their modal face-value. In the latter case one empties the words one uses of their fuller modal significance. In either case there is risk of misapprehension.

Now the word "organism," as used by the biologist, has a middle position between these extremes. It implies the adjective "living," and what this implies is the storm-centre of controversy. Some there are who interpret all organic action in the modal terms appropriate to physics and chemistry. Others there are whose interpretation is couched in the modal terms appropriate to psychology.

It is difficult to see on what logical grounds biologists of the first school—the so-called mechanists—can resent the downward extension of the connotation of the word “organism” to natural entities which, as they claim, differ only in their lack of super-added complexity—differ nowise essentially in type of action or behaviour. It is, however, easy to see on what logical grounds biologists of the other school—the so-called vitalists—can resent, and will no doubt reject, a concept of organism which implies that it can adequately be discussed in terms of an organic theory of nature without introducing any further concept such as *entelechy* or *elan*.

An organic theory of nature which recognizes diversity of modes is neither mechanistic nor vitalistic. It accepts all that it finds. No duly accredited characterizing quality distinctive of the living organism, as contrasted with the not-living, is disregarded or slurred over. It is just these characterizing qualities that are claimed to be emergent because they are not reducible to, or deducible from, the qualities of organisms of lower status in the hierarchy. In brief, one deals with characterizing qualities of living organisms, as modally different from those of, say, molecular organisms, on the same general principles as one deals with the characterizing qualities of molecular organisms, as modally different from those of atomic organisms.

It is because, as I think, there are certain general features of organisation that are common to all organisms, whatsoever may be their status in a natural hierarchy—it is for this reason that I welcome the use of one word for each and all of them.

But if we do this it seems permissible to vary the ways in which we may give verbal expression to these common or general features, extending them both upwards and downwards, so long as one makes it clear that, in upward extension, there are specific modal characters progressively *more* than the general feature

common to all organisms, and that, in downward extension, there are specific modal characters retrogressively *less* than those that obtain at the higher level. After all, one wants in some way to distinguish the general feature that is "common form" from the specific characters which earmark what I speak of as "modality" in a sense that, I hope, is comprehensible. And how one does this does not much matter if it may help others to grasp the notion to which one seeks in some way to give verbal expression.

I have hitherto tried to do so in terms of stuff and substantial unity. But I feel pretty sure that some people have taken this to mean material stuff constituting such a substance as sugar or salt—anyhow, something obviously connected with gross matter. No doubt some risk attends the use of words which may be thus misinterpreted.

I now run even graver risk of being misunderstood when I use words taken from the other end of the hierarchical scale—when I borrow, and adapt to my purpose, words properly applicable (it may be said) only to social affairs—when I try to state a concept of the organism in words which must be emptied of their specifically modal significance in those affairs. Taking this grave risk, this is how I should venture to express the general position. The organism—any organism in the unrestricted sense—is, I make bold to say, a community of members in fellowship, each of which is in sympathy with, and of service to, the others, and each of which plays its part in relation to the parts played by other members in the organic whole which is the organism, whatsoever may be its modal status.

Mr. Whitehead's extension of the range of application of the word "organism" goes hand in hand with the implications of an organic theory of nature which is taking a new form. And the objection to any such extension is, so far as I can gather, mainly "on principle." It is the whole theory, the implications of which the word "organism" are now to carry, that must stand the

brunt of attack— not merely a new convention in the use of this word.

But, since a new convention is entailed, one must make passably clear what are to be characterizing features of any organism in the extended application of the word. This I now attempt to do in terms of "fellowship" and certain allied words. They are used for purposes of exposition in the hope that thereby the way in which I, for one, characterize any organism may be grasped by those who care to understand. One's difficulty is to find some word or set of words which shall express what one wants to express, and this difficulty is all the greater since those words from which one has to make selection are already earmarked for use at some more or less definite stage of evolutionary progress.

It is worth while to consider briefly the general position. Let us assume that what one may speak of as a doctrine of emergent levels can make good its claim to be understandable. Then there are some words which we may agree to use only at this, that, or the other level; some words which we may agree to use at all levels. Let us speak of the former as restricted to one-level usage, and of the latter as extended to all-levels usage. The trouble is that you and I may not agree as to which words shall have one-level signification and which words shall have all-levels signification. Under these circumstances the best course for me to pursue is to tell you as clearly as I can the usage I adopt, so that you may at least understand, even though you are nowise prepared to accept.

I beg you then to understand that an organic theory of nature is, for me, a distinctively all-levels theory; that, within this theory the concept of evolution and the concept of the organism are all-levels concepts; and that for purposes of exposition (I ask no more) I elect to use the word "fellowship" and some allied words with all-levels signification. My aim is to help you to understand. Whether you agree or not is another matter.

But if you read into words used in subservience to my theory the implications they convey on your theory, there is bound to be misunderstanding.

We have, then, words applicable at all levels and one-level words. But when one comes to details one has often to show in some way that, though one still uses the noun with all-levels import, one wishes to direct attention to the manner in which it may be applied at some one level. Adjectival restriction of the noun enables one to do this in ways that leave little scope for ambiguity—mental evolution, the atomic organism, molecular fellowship, and the like.

It may be said that, even for purposes of exposition, the word "fellowship" is, under well-established convention, so distinctively a one-level word—some may say a word of spiritual import—that its all-levels use is, to say the least of it, ill-advised. I fully admit the force of this objection to my use of it. I should welcome some other word or set of words to express what I want to express. As things are, I make use of the best I can find.

It should be realized that, in the organism as thus conceived, the emphasis falls, not so much on what a member is, "in itself," as on what it does in fellowship with other members. By what it does, I mean the part that it plays in the community—the service it renders to others and to the whole. We are dealing with a theory of *behaviour* or *action*: we must therefore lay stress on how things *go*, and on how they *go together*. In the conventionally restricted concept of organism we mean the living organism—a going concern. In the broadened concept, any organism is a going concern. Subject to downward extension, one sometimes speaks of the "life" of a star, of the uranium atom, or even of some machine. With due stress on action, then, the integrity of the organism—any organism—is preserved only so long as each member—be it electron in an atom, be it workman in a factory—plays a specialized part in sympathy with others in the organism as a whole;

and the integral whole is what it is only so long as all the members behave or play their several parts in fellowship and mutual service.

Further light is thus thrown on the concept of evolution. The upward trend in evolution is towards associative fellowship, and towards higher modes of association. But we have to realize that, in the world as we know it, there is also disassociation. Thus Spencer's word "dissolution" has added significance. It is dissolution of fellowship or partnership.

Is it mere play upon words to link up part, part played, and even partnership? Without going so far as to assert that "every part, while remaining in fact what it is, is ideally the whole" (Lossky), the contention, under an organic theory, is that each "partakes" in the whole, and that the whole is in the parts -- all of them -- in so far as its share in the substantial unity is "imparted" to each of them severally. The nature of this unity, omnipresent in the whole, depends on the modes of relatedness in virtue of which that whole is an organism.

It is in respect of "modes" not "kinds" of relatedness that I, for one, speak of "emergence." But what we are trying to get at just now is that which is *common at all levels of modal emergence*. So we start with the social organism where the words "community," "members," "fellowship," "service," "sympathy," and the rest, are used with their current modal signification. We pass downwards, from the social organism, to a man, an amoeba, a bacterium; to a crystal, a molecule, an atom -- as far as accredited science can take us. And then we ask: Do we at all stages find something of the same sort as members in fellowship under sympathy? If so, we must deliberately strip off, as we work downwards step by step, those specifically emergent characteristics which distinguish the higher modes of action, and qualities co-related therewith, from the lower.

I know full well that it may be said: You have no right to speak of a "sort of fellowship" if you empty this word of all that

is distinctive of human fellowship. To talk of electrons in an atom, or atoms in a molecule, as associated in fellowship, is a preposterous misuse of words entailing a degradation of concepts. Can a mere "it" play a part, or render service, or act in sympathy with others? Assuredly not. Essential to the concept of fellowship is that each member plays his part, behaves, or acts, with conscious reference to the acts of other no less conscious participants in the well-being of the social community. Here we have associative partnership of free agents. Human purpose rules. There is implied some worthy end to be attained through fellowship, service, sympathy, and the rest.

Apart from such objection "on principle" as underlies this summary rejection of the downward extension of the notion of fellowship, I fully realize the conventional objection to the use of words which carry modal significance at a high level of mental evolution for that which, as I think, is "common form" in all evolution, physical no less than mental. But if there be something common to all levels in the hierarchy of organisms one must in some way give to it verbal expression. That this is the best way I am far from asserting. One has to include under sympathy, for example, what, rightly or wrongly, the physicist does not uncommonly include when he says that this or that piano-wire, when the dampers are raised, vibrates in sympathy with some note firmly bowed on the 'cello. In this sense there may be sympathetic reaction to some specific mode of physical action often said, under downward extension of another word, to be "selective" reaction. Even under relations of the physical kind, is there not a valid sense in which one may say that any change in the part that one constituent member of the social community plays in some measure influences the part that each of the other members plays, so long as all are attuned in associative fellowship? Only on such terms as these, according to an organic theory of nature, is the substantial unity of any organism pre-

served. If this fail there is disassociation—there is dissolution of fellowship.

Seeing that one is forced again and again either to coin new words or to adapt old words to meet the requirements of new ways of thought, this mode of expression may at least be given a trial with a little dose of good-will. How, then, does it run as compared with that couched in terms of items of stuff in substantial unity?

Let us provisionally arrange "natural entities" in ascending order in an emergent hierarchy. Such a suite may be: Atom, molecule, colloidal unit, "biocule," cell, multicellular organism, community of such organisms. Here "biocule" stands for a hypothetical link in the chain. One may express the underlying principle of the hierarchy thus: In atoms the items of stuff are electrical units which go together in substantial unity under a determinate mode of relatedness; in molecules the items of stuff are atoms in a new mode of relatedness; and so on up the scale. Under generalized statement, z -items of stuff are so related as to constitute y ; y -items to constitute x ; x -items to constitute w In due course living cells are inter-related in corporate unity to constitute the multicellular organism. Nor need we stop here. Even in regard to physical relatedness, is not the social community an association of members in fellowship under new modes of corporate relatedness?

Having thus reached the notion of fellowship, under a theory of nature which is through and through organic, we feel justified, at any rate for expository purposes, in inverting the order. We start with the social organism as a community of members (men and women) in sympathetic fellowship on an organized plan. Then, remembering that some sort of sympathetic fellowship, on some sort of determinate plan, is what *ex hypothesi* is distinctive of *any* organism, there follow in descending order of status, say -

The living organism : community of members (organs : cells : " biocules ").

The colloidal organism : community of members (molecules : atoms).

The molecular organism : community of members (atoms).

The atomic organism : community of members (electrical unit-events).

In such a series evolution is passage from lower to higher status in organisms each a community of members which play their parts in fellowship each influencing, and being influenced by, the others under sympathy. And this passage must be discussed in terms of all the modes of fellowship in all the kinds of relations of which in each organism there is evidence. So far as emergence obtains it would name the incoming of new modes of complexity, of quality, of value, and so forth, characterising new modes of fellowship in all kinds of relation, including, of course, relations of awareness culminating in objective and reflective reference, as organic to nature. Can organic evolution in all the higher and in many of the lower animals receive adequate treatment if relations that reach the level of conscious reference be left out of account ?

We have, then, the concept of organism and the notion of fellowship. We want so to combine this concept and this ancillary notion that each shall throw light on the other.

Now, if we start with the living organism, or with the crystal as a not-living organism, the idea of a definite boundary-surface comes to mind. We must therefore ask whether this distinguishing feature is essential to the concept of the organism in our extended sense of the word. Take extreme cases. Take the " microscopic " atom on the one hand, and the " macroscopic " solar system on the other hand - on the assumption that we may regard sun, planets and satellites as members in fellowship. Neither has a definite boundary-surface within which the organism

is enclosed. It may be said that the words "within" and "beyond" thus lose their common-sense meaning. But may they not still mean "within or beyond this community of members that play their parts in this kind of fellowship"? If this be accepted as not discordant with common-sense notions, it seems that the idea of a well-defined boundary-surface is not essential to our concept of organism. Does not this serve to remove one difficulty in applying the concept to the social organism?

But another, and perhaps graver, difficulty may arise when we find that, in social affairs, one man may play a part in half a dozen modes of human fellowship: may be, as we say, a member of several "societies": the English Association, the Aristotelian Society, the Corporation of his City, the Wesleyan Community, his Golf Club, and so forth. Are we, then, to talk of so many "organisms"? Does not so many "organized societies" suffice to express the position?

Furthermore, it may be said that in human affairs the only organisms, properly so-called, are the men and women who play their parts in those relations which we call social. And then it may perhaps be said that how they play their parts does not serve to determine what these organisms severally *are*; it serves only to indicate what they severally *do* under certain given circumstances. A man is what he is, "in himself," no matter whether, in due season, he plays the part of butler, or sidesman, or flautist, or husband, or father, or advocate of free trade. So, too, in respect of "natural entities." An electron, an atom, a molecule, a living cell, as an organism, is just what it is, no matter what modes of relation it enters into. The earth is what it is --to wit, the earth, no more and no less --though it is also in physical relations to the sun, to sundry planets, and to its satellite, the moon.

Two closely allied questions here arise: (1) Granting that the concept of emergence is valid and can be rendered fairly definite, where is the primary locus of emergence--in the com-

munity or in its constituent members? (2) Is a member in associative fellowship what he is *qua member* in virtue of the modal relations that obtain within the community of the organism? The questions are closely allied. And I think that the affirmative answer to the second, which we must give in accordance with an organic theory of nature, entails, on that theory—at least in my rendering of it—the centring of emergence in the constituent members of the community.

I say on *that* theory. On a wholly different theory of nature it may be said that a somewhat called, let us say, *Molecularity*, descends upon a group of atoms and creates the molecule; and that a somewhat called *Life* descends upon a colloidal cluster of molecules and atoms in such wise as to be creative of the living organism.

For better or worse I distinguish emergent (or resultant) evolution as a scientific proposition (under my characterization of science) from any form of Creativity—to adopt Mr. Whitehead's designation. Creativity, in my view, raises a cardinal issue in Theory of Reality: but it has no place in an organic theory of nature which is based on the generalized conclusions of modern science. This does not mean that I deny to Creativity a due place in the larger problems raised under Theory of Reality. It means only that I plead for a distinguishing of issues that I feel convinced are analytically distinguishable. For me, therefore, the current phrase *Creative Evolution* should be replaced by *Evolution subject to Creativity* or something of that sort. I cannot here discuss so large a problem. I do not claim that the distinction I draw must be accepted; but I beg that those who care to listen to what I have to say should be at the pains to understand what I seek to express; otherwise, we shall be at cross-purposes.

With regard, then, to the locus of emergence, I feel confident that it must be sought in the members in fellowship; and I find

the notion of fellowship helpful in giving expression to the answer I give to the rather crucial question : What is emergent and where is it emergent ? Of course, we may say : A new mode of fellowship is emergent ; it now is, whereas heretofore it was not. But, if we probe deeper, it seems that the emergent character (if such there be) must be traced down to the constituent members of the community. If in a human community there be an emergent attitude in æsthetic valuation, it is in the men and women of that community that, if anywhere, an emergent character must be sought. If in some ant-community there be evidence of emergent advance, what is emergent is in the several ants as members in fellowship. In the multicellular organism, so far as emergent, we must look for such properties of the cells in fellowship as give to the living organism its emergent status. And so on. But in each case, though we must seek for evidence of emergence in the members, it is only under some determinate mode of fellowship, no less emergent, that something genuinely new finds expression. In other words, what the member is, in emergent regard, that it is, *qua member*, in its relations to all other members. And this was the answer we gave to the second of the closely allied questions.

One is here tempted to open up the vexed matter which logicians of differing schools discuss, in prolonged debate, under the heading : Internal *v.* External Relations. But there the universe of discourse is theory of knowledge. Here our primary concern is with theory of action. Although the issue is of much philosophical import, and although it is germane to an organic theory of nature* it must suffice to submit that, where the stress is on action, the part that, in the organism, some member plays in relation to others is "in part" determined by the parts that these others are playing. This brings us back to the notion of associative fellowship in action or behaviour.

* cf. Whitehead, "Science and the Modern World," pp. 174-5.

Let us assume that electrical units play their parts in the fellowship of the atom ; that atoms play their parts in the fellowship of the molecule, and so on up the gamut as far as we can profitably go in dealing with concrete situations. Let us assume that there is some measure of determining reciprocity in part-playing under relations of sympathetic influence. So far we have members of like status in concerted fellowship. But the implications of an organic theory, if they be pressed home, may go further than this. A further implication may be that *all* members, whatever may be their status, play their parts subject to the inter-related fellowship of the organism as a unitary whole.

What does this mean ? Let us revert to the principle of a hierarchical order. We start with low-level organisms which we label *z*'s. These are associated in a higher mode of fellowship to constitute *y*'s ; these again are associated in a new and yet higher mode of fellowship to constitute *x*'s ; and so on up a scale disclosed by factual evidence. Thus, down the scale, we have, say, *c*'s playing their parts within each *u*, *w*'s within each *c*, and so on till we get down to bottom-level *z*'s. It is clear, then, that each *z* plays a part at all levels within the highest organism in the hierarchy. The question then arises : Is the part played by any *z* in sympathy with what is going on at all levels above it in the complex organism *u* ? I take it the answer is : We do not know. How the atoms play their parts in the molecules of my body *may be* a purely molecular affair. But they *may* play their parts with a difference dependent upon the condition of my body as a whole at the time being.

No doubt it may savour of extravagance even to suggest, as an open possibility, that while I listen to the opening chords of Handel's *Largo* there is no physiological process in my body that remains wholly uninfluenced by what goes on in my brain ; that all molecular changes within me then and there run their course

with a difference ; that even the orbital dance of electrons in atoms that are members of each several molecule responds in some measure to the physical influence which takes effect on the cochlea of my ear. It seems here to be suggested that everything is related to, or co-related with, everything else. And this, as it stands, seems pretty vague. Here, however, it is not quite so hopelessly vague, for it is qualified by the proviso "within the human organism." Even so, as a scientific proposition, we must regard it as an open possibility. But as a philosophical proposition --speculative, no doubt--it does seem to be implied in an organic theory of nature. And I gather that this is Mr. Whitehead's belief. "Thus," he says (p. 111), "an electron within a living body is different from an electron outside it by reason of the plan of the body . . . and this plan [of the organism which includes the body] includes [also] the mental state." The words within square brackets are mine. "But," he adds, "this principle of modification is perfectly general throughout nature, and represents no property peculiar to living bodies."

If this be so, it is an implication of an organic theory of nature that, within an organism, all the members, whatsoever may be their status, play their several parts, or, in a liberal sense behave, in sympathy. But in order that there be such associative fellowship, in our extended sense, the constituent members must in some way, or ways, be related. If after prolonged and resolute analysis we dig down to what seem to be the simplest of simple events--however they may be described or defined--still in all organisms, whatever may be their status in a hierarchy of ascending levels, it is only when these events, or communities of events, are related in certain ways in accordance with some describable natural plan--it is only then that substantial unity obtains within this or that organism. It may be the plan of the atom, of the molecule, of the crystal ; of the cell, of some gland, of the living organism ; of some associative fellowship of living organisms ;

always a subtle combination of kinds and modes of relatedness, so that one can say : Such and such mutual relatedness in fellowship, such and such observable or inferable behaviour.

II.

There seems to be not a little misapprehension as to the position which those who advocate emergent evolution are concerned to defend. Some critics seem to suppose that the contention is : All evolution is by discrete steps, each of which introduces something new ; therefore no evolution is by continuous slide with resultant outcome. That is not so. At any rate, I, for one, disclaim intention of saying anything of the sort. It has been my aim to emphasize the contention that what is genuinely new, in a sense duly characterized, in progressive advance, is of the emergent type, as distinguished from the resultant type. My claim is : Some evolution is by discrete steps, each of which introduces something new. Stress on emergent factors in evolution does not imply denial of resultant effects.

When we consider organic evolution this must be borne in mind. If the biologist adduces thousands of examples of changes in living organisms which are interpretable mechanically as strictly resultant, that is no argument which serves to disprove the occurrence of changes which, as we think, must be interpreted as strictly emergent. If both types of change are in evidence, our aim should be to distinguish the one type from the other.

In the last quarter of a century a change (resultant or emergent!) seems to have come over the scene where the play of interpretation is rehearsed and re-enacted. In old days the concept of that which one may speak of as continuous *slide* was so dominant that *steps* apparently discrete were attributed to failure to detect the slide that occurs in the interval between

what is given in our step-like observations. There must, it was said, *ex hypothesi*, be no sharp angles, but a smooth change of curvature, in which all trace of salience will finally disappear.

Nowadays there is a noteworthy tendency to regard apparently continuous slide as a mass-effect attributable to our failure, under statistical method, to isolate individual entities in the crowd which forms the mass-aggregate. On this view the rounded-off curvature of nature is like that which is presented to appearance when a great number of polygons, each differing very slightly in position, are superposed in one composite photograph with continuous outline just a little blurred. We have yet to learn which hypothesis - if it be a case of one or other - best fits the facts of close and minute observation in this or that field of scientific inquiry.

Here we come into touch with that which physicists, in their specialized field of extraordinary exactness, discuss under quantum of action. In far wider fields, not susceptible of such exactness of treatment, we come into touch with the concept of emergence. On quanta I shall not touch lest I should burn my fingers. It is with the bearing of the slide-or-step question on resultant or emergent advance that we are here and now concerned.

In speaking of such organisms as may be placed in an ascending hierarchy of emergence, I laid stress on that substantial unity in some definite mode of fellowship which gives to it the status of an integral whole. If the question be asked: What measure of substantial unity? I should reply: Such measure as we find: but always such measure as to render the organism capable of maintaining its existence as such.

It must not be supposed that what one means by substantial unity is a characterizing feature that is absolute and ideally perfect. This may be, and I think is, for some exponents of Theory

of Reality, an implication of this expression. Suffice it to say that, in my usage, neither the word "organism" nor the expression "an organic theory of nature," nor "substantial unity," is intended to convey any such implication. It may be that no organism affords evidence of more than an approximation to substantial unity in the sympathetic action of all its members. As things are, the nearest approximation seems to be disclosed in the atom. Contrast this with such measure of substantial unity as has so far been reached in the social organism. Between these extremes is the living organism. What measure of substantial unity here obtains? To answer this question we must turn to the evidence. The biologist may adduce many instances, observable, let us say, in the course of embryological development, which indicate what one may speak of as a mosaic structure of, for a time at least, relatively independent centres of action. He may say that they disclose, at this stage, very little functional inter-relation in biological unity. No doubt they are bound up in one embryo under certain purely physical relations. But other than this there is little that can be spoken of as substantial unity.

I am not wholly unacquainted with such facts. I submit, however, that, from the point of view of general theory, though these mosaic items are collocated in juxtaposition under such physical relations as this entails, still, so far, they constitute an aggregate of organisms in *resultant fellowship* rather than one-organism in the substantial unity that characterises *emergent fellowship*.

This re-introduces a distinction which is worthy of fuller consideration than it has yet received. It raises further questions as to what implications the word "organism" is or is not to convey in our organic theory of nature. And this leads up to the larger question: Is nature as a whole to be regarded as an organism?

I confess to some qualms of doubt as to the propriety of my use of the word "fellowship" in so wide a sense as to include what I spoke of above as resultant fellowship. This doubt arose when in the foregoing section I suggested that sun, planets, and satellites may be brought under the rubric of associative fellowship. They are, however, in some sense "associated" in the solar system. The part that any one of them plays within this system as a whole is in large measure determined by the way in which their associates are behaving. Action here is in physical sympathy with action elsewhere. There is some substantial unity of harmonious accord within the system as a whole. And so on. Does all this render my expository notion of fellowship applicable to the solar system? In the liberal sense intended I find it difficult to say in what respects it does not. Let us so far extend our liberality as to give it the benefit of the doubt.

Are we, then, to regard the solar system as an organism? Half a century ago—let us say prior to 1863, when Huggins opened the door to the application of spectroscopic research to the stars—the solar system was interpreted in terms of celestial mechanics. Since then the attention of astronomers has been more and more concentrated on cosmic physics—on the internal constitution of the stars, including our sun, in terms of atomic and sub-atomic changes. But even now the solar system as an association of sun, planets, and satellites, is still interpretable in the dynamical terms appropriate to celestial mechanics. Are we, then, to regard the solar system in *this* respect as an organism? If so, we must regard it as the outcome of resultant advance. This means that with full knowledge of some given phase of the state of affairs in the solar system—taken as an isolated system—any subsequent phase could be confidently predicted. They all fall within one uniform natural plan on the basis of which deductions can be drawn. On such deductions most of the almanac predictions of astronomy rest.

If, then, it be permissible to regard the solar system as an organism, we should speak of it as a "resultant organism," the outcome of "resultant advance."

"Emergent advance" is that which I have sought to illustrate by such a series as atom, molecule . . . living organism and the rest. At each stage in advance the outcome of one mode of fellowship, say that of the atom, becomes suddenly—or so swiftly that intervening steps have not as yet been traced—a member of a *different* mode of fellowship, say that of the molecule. It need not forthwith become such a member. During some brief period of transit, for example, it may not pass within the range of molecular influence. Thus for awhile it retains its atomic freedom from the restraint which molecular fellowship entails. But when it does enter into further fellowship, when it does come within molecular range, it does so under certain assignable conditions, it behaves in accordance with some definite plan. At each ascending stage of the hierarchy there is something quite new in the plan—something that leads the man of science to say: This calls for expression under a different formula. The plan, as new, is universal in the sense that it is common to all atoms, all molecules, and so on. To emphasise the common ground-plan at each stage one speaks of *the* atom, the molecule, the crystal unit—more comprehensively, of the organism: or, subject to appropriate adjectival restriction, one speaks of the molecular organism, the living organism and the rest.

At each stage, then, we deserve a ground-plan distinctive of that stage. But within the ground-plan, say, that of the atom, there are sub-plans, say, that of the hydrogen atom and that of the oxygen atom. The number of electrical units in fellowship increases as we ascend the atomic scale: the specific manner of fellowship differs in such ways as the evidence discloses. There is, however, something else that the evidence discloses. It discloses that with such and such a manner of atomic fellowship

there go what we speak of as distinguishing qualities or properties. This holds good not only for the several atoms, but for the several molecules, crystal units, and so on. Whatever else may be said about such qualities and properties—and they are not easy to classify—this, I think, may be said : With specific spatio-temporal plans, having certain primary modes of physical relatedness, there are constantly co-related certain modes of relatedness that are other than spatio-temporal and primarily physical only.

One is now in a position to state the truth-claim that is embodied in the notion of emergence. The claim is that there is in nature not only resultant advance on one uniform plan. That, however, is merely an indefinite claim. The definite claim is that there is also what we call emergent advance on a multiform set of plans. But some say that the notion of emergence is so smudgy and vague that to speak of a definite claim is absurd. We must ask, then : How may emergence be so characterized as to rebut the oft-repeated taunt that it is merely a philosophical whimsy of which men of science need take no notice ?

One must seek to render it definite in some definite domain of scientific inquiry. I select one which is more exact than most of the other domains—that which embraces the atom and the molecule, two of the stages in our emergent hierarchy. In the interest of exactness let us concentrate attention on plan—spatio-temporal plan in a physical field—regarding co-related quality as secondary thereto. The claim, then, is that, when we pass from one ground-plan to another—from that of the atom to that of the molecule—what is distinctive of the new ground-plan is not reducible to, and therefore not deducible from, that which is distinctive of its evolutionary predecessor ; and, if not deducible from the data disclosed in the ground-plan of its predecessor, then, as new, not predictable from what one may speak of as the platform of the old. It is this, we claim, that characterizes

emergent advance ; and this, we claim, holds good for any two emergent stages.

In one's capacity as generalist one is dealing with the existing state of scientific knowledge. But one has to rely on the findings of specialists. Now, specialists in atomic research give one a pretty clear notion of the interplay of protons and electrons in the atom. One turns to those who can speak with authority on the molecule. They tell us, as I understand, that atoms in a molecule are inter-related on a ground-plan quite different from that on which the electrical units are inter-related in the atom. Of this different ground-plan one may say : In the atom it was not ; it now is in the molecule. One would suppose that without cavil one may call a ground-plan that was not and now is a new plan.

But the crucial issue, stated in practical form, is : Could those who are intimately acquainted with the old plan foretell *from the platform of this intimacy* the quite different inter-relations which characterize the further fellowship of atoms in a molecule on the new plan ? It is difficult to see how they could do so if the ground-plans are quite different. Unfortunately, it is not the sort of thing that can readily be put to the test in practice. One cannot train some able student on the atomic plan only : ask him to predict the molecular ground-plan : and see what he makes of it. So we turn to the logician. Some logicians tell us in effect that, given all the known factors of the atomic plan, there are not adequate and sufficient data for saying what the molecular plan must be : that is, for deducing the new from the platform of the old. Hence the stress that Dr. Broad lays on the logical criterion that may be expressed by saying : Not deducible from the data afforded by what is given prior to emergence.

Does this rule out of court deduction wherever emergence obtains ? What it does rule out of court if the phrase be appropriate—is the deduction of a new ground-plan, or such

qualities as may be co-related therewith, from a known ground-plan lower in the emergent hierarchy. It precludes, for example, prediction of the nature of molecular fellowship from our knowledge of the nature of atomic fellowship. But if there be good grounds for accepting such a generalization as may be called "the law of the atomic series," deduction *within that series* on the basis of that law is permissible. There is, for example, nothing to preclude the prediction of what will be the nature of such and such a "missing link" in the chain of atoms. It will be put to the test if or when the element, interpolated on the basis of the law, swims into the ken of discovery. Such predictions are common at each hierarchical level. If they be fulfilled, the grounds for accepting the law of the series are strengthened.

Nay, more. Should we be in a position to formulate a "law of hierarchical emergence" it would be permissible to deduce, on the basis of that law, the nature of some missing link *within* the hierarchical series. What seems to be precluded on principle is any prediction as to the nature of what may next be evolved *beyond* the hierarchical series as given up to date, or even whether anything further will be evolved. "Gentlemen," says the logician, "let us keep within the evidence."

Now whether, in what I have said with respect to the atom and the molecule, I have made out a good case for emergent advance, it is for those who are acquainted with the facts to decide. But, supposing that I have done so, it may be said that in applying the concept of emergence anywhere else in nature I go beyond the evidence. Beyond *this* evidence—yes. The first thing to do is to establish a principle of interpretation. That done in one domain of inquiry, the next thing to do is to show in what other domains the principle is applicable. And this is clearly a matter of evidence within each of these domains. One may ask, for example: Does it apply, not only within the atom-molecule domain, but also within the molecule-crystal domain?

Then one would turn to such evidence as the researches of Sir William Bragg may disclose. As I read the evidence, it is in favour of the emergence of a new mode of crystalline fellowship differing from that of molecular fellowship. Or, on a larger scale, one may ask : Does it apply not only within the atom-molecule domain, and within the molecule-crystal domain, but also within the physical-physiological domain ? Is life-fellowship a new mode of fellowship ? I hold that it is a new mode on a new plan. I believe that, in accordance with a "law of hierarchical emergence," the transition from the not-living to the living exemplifies emergent advance. I contend that there is here, too, a new factor, or suite of factors, in evolutionary progress.

I need not discuss the evidence. One would only come back to the question already discussed. One would merely raise this question in the new form : Does the living organism disclose a ground-plan of fellowship, the distinctive features of which are not deducible from that of any not-living organism ? Some of us think that it does. We contend that the distinctive features of the one could not be predicted on the data afforded by the fullest and most intimate acquaintance with the distinctive features of the other.

But we do not regard this as a camouflaged confession of ignorance. We regard it as the profession of fuller knowledge of evolutionary advance. It does not block the way to further inquiry ; it opens up new lines of investigation. If our concept of emergence be founded on observable facts : if under determinate conditions, susceptible of definite statement, new modes of fellowship do emerge : if, as we claim, there be coming into view a law of the hierarchical sequence of emergents --on what grounds can this be called the mere hiding of a confession of ignorance under a name that is so vague as to deceive the unwary ? Is it not rather a worthy endeavour to extend our knowledge of nature ?

Our contention is that to-day there are far more cogent grounds for incorporating emergence in a schema for the interpretation of nature than there were half a century ago. But the trouble is that one who advocates emergent evolution is sometimes supposed to deny resultant evolution. He is supposed to say in effect : *Not* resultant advance, *but* emergent advance.

Let us consider the attitude of those who do nothing of the sort. Fortunately, a brief statement will suffice. In resultant advance the conditions are such that there is homogeneous continuity in some one mode of fellowship. Hence deductive conclusions are relevant all along the line of advance. With adequate knowledge of the law of such advance, predictions as to the exact nature of any later phase could be made from the platform of any earlier phase. More strictly, the events are all on one platform with uniform slope or one-equation curve. Hence the unlimited range of astronomical predictions in so far as they are based on principles of resultant mechanics.

Now change the venue to the vexed biological issue. The "mechanist" says in effect that all processes and products from first to last—from the not-living phase to the living phase—are susceptible of resultant interpretation. They are all on one homogeneous plane of resultant advance. And he points with justifiable pride, which others may share, to the outcome of such treatment. There are, as he frankly admits, sundry physiological processes which still present difficulties. What of that ? Further research on this method of interpretation will resolve them in due time.

What, then, say those who have been led to accept emergent advance ? Do they deny any one of the successful achievements based on resultant treatment ? If they do they are, as Dr. Broad might say, remarkably silly. What they do submit is that there is a mode of fellowship in the clustering of events within the living organism that is of such a nature as not to be deducible

from that which obtains in the not-living. They submit that, in detail, there are *some* physiological processes which elude the meshes of the resultant net, which are on a different level of emergence, which could not be predicted from the not-living platform.

They may be wrong. The verdict of the future with regard to emergence in the living organism may be : Not proven. We are, however, dealing with matters as they are while the case is still *sub judice*. And our attitude is : Resultant advance in plenty ; as much as you can prove ; but not a few residual matters which bear witness to emergent advance. If this be so, is not the upshot this : The living organism in physiological regard is such as to exemplify evolutionary advance, not resultant only, not emergent only, but both resultant and emergent ?

Should not this be our attitude in broader biological regard and in social regard ? Now that the concept of emergence has been admitted into the field of serious discussion there is grave danger of its being used wildly and without discrimination as a popular catchword. People talk of the emergence of the elephant or the mongoose ; the emergence of the social hymenoptera, of polymorphism in ants ; perhaps the emergence of mimicry or of display in courtship ; perhaps also the emergence of human civilisation. And critics of emergent evolution pass on to other matters with a tolerant smile.

It may, however, be said : We thought that evolutionary progress is what you stand for in what you speak of as an organic theory of nature. But now it seems that you propose to introduce sundry rather puzzling reservations. If polymorphism in ants to select one of your examples if, in other words, the differences of structure and diversities of behaviour that characterize the members in fellowship within some social community of ants be not the outcome of evolutionary process, of what natural process is all this the outcome ?

I do not suggest that all this is not the outcome of, or does not afford an instance of, *evolutionary* progress. My aim is to distinguish, within this progress (1) that which is deducible on the method of resultant treatment, from (2) that which is not deducible on this method. The former I speak of as resultant advance ; the latter as emergent advance. I submit that, on the evidence, we find in the field of biological inquiry both emergent and resultant advance. My plea is for careful analysis. If emergent evolution be accepted, it does not follow that all evolutionary progress is emergent. That being so, what has to be done — and I hope will be done — is to disentangle (i) such not-deducible emergent factors as may have contributed to this or that end-product of evolutionary progress from (ii) what is deducible in concurrent resultant advance.

There are a good many critics who seem not yet to have grasped just where the concept of emergent evolution is applicable. They seek to apply it where I, for one, hold it to be inapplicable. They may then ask: Where is the evidence for emergence in the evolution of the solar system as interpreted under celestial mechanics? Or, turning to the biological province of inquiry, they may ask: What bearing has this concept of emergence on, say, the theory of natural selection? It may savour of extravagance if I express the opinion that on this theory, as such, it has little or no bearing.

To make my meaning clear, I must ask: Are we, under natural selection, dealing with the survival of variants or with the origin and transmission of variations? In the opinion I express I assume that the theory of natural selection *as such* deals with variants, and that the origin and transmission of variations fall for discussion under a different theory — that of genetics. If this be so, the issue for natural selection is a plain issue. Are some variants weeded out in “the struggle for existence” or are

they not ? If some are weeded out, leaving others to survive, I regard such elimination as a resultant effect.

That leaves the origin of variations (or of mutations) to be discussed as a separate issue. It opens up a wide field of inquiry, including Mendelian research. Here, in any genetic theory, the question does arise : Is this or that variant the outcome of resultant, or emergent, advance ; or is it a joint product of both ? If both are given in the evidence, the emergent factors should be distinguished.

My plea—and here it comes to a plea—is : If the concept of emergence be accepted, let us make quite clear just where this concept is applicable. When I express the opinion that it is not applicable to natural selection, as such, it should be obvious that this does not preclude the survival of those variants which have genetic characters that can be shown, under searching analysis, to be emergent in origin. Biological inquiry includes both natural selection and genetics ; and genetics discloses, as I think, both emergents and resultants. Is there not pressing need for the exercise of distinguishing analysis ?

Revert now to the distinction between celestial mechanics and cosmic physics. The former, as we have seen, affords examples of resultant advance. But in the latter there is need to distinguish (i) resultant advance in certain mass-effects from (ii) emergent advance in what we may speak of as microscopic detail.

In its modern form cosmic physics deals with the evolution of stars ; with the energy-changes within them ; perhaps with the transformation of what the plain man supposes that he understands by “ matter ” into what he feels quite sure he understands by “ radiation,” and much else. For one interpretation of a fascinating story one may turn to Dr. J. H. Jeans’ *Recent Developments of Cosmical Physics** ; for an alternative version (in some

* Suppl. to *Nature*, Dec. 4, 1926.

respects) one must tackle at least the first chapter of Professor Eddington's *The Internal Constitution of the Stars*.

Most of us have a bowing acquaintance with some of the salient features of this new story of the heavens. What are some of the questions that arise for us here ? May we regard that which is so often spoken of as " the life of a star " as the evolution of an organism in our extended sense of the word ? It seems to have, as distinguishable, early, middle, and later phases. It is describable in terms of a rounded-off fellowship of events. Does it, for us, exemplify resultant or emergent advance ? What we may speak of as net-results and mass-effects, statistically treated, seem to fall under the heading of " deducible " ; but in microscopic detail the whole story discloses bewildering but orderly changes in the atomic fellowship of protons and electrons, with alternations of evolution and dissolution under conditions of temperature and pressure so high and so great as to be well-nigh inconceivable. Of molecular evolution there are little more than a few occasional instances. Now all this is, for us, emergent in principle. We have here an intensive study of what occurs, under extra-terrestrial conditions, at the sub-molecular stages of our ascending series with, near the close of a star's eventful career, the first fruits of the molecular stage of emergent advance.

If, then, the distinction between resultant and emergent advance be valid, should we not seek to distinguish the factors subtly woven into the " life-history " of a star ?

In microscopic detail fresh light is thrown on the concept of emergence as illustrated in the atomic series. And if what Dr. Jeans contends for makes good, it seems that in the central core of a star, and in the filmy structure of a nebula, there are atoms higher in the elemental scale than those of uranium, which stands at the top of the terrestrial series. If this be so, it is in terms of the dissolution of these super-atoms that much of the story of radiation must be re-told.

The question then arises : If we seek to pry back into the very beginnings of cosmic events, are we to start with some highly complex super-atom from which atoms lower in the scale are derivative under dissolution of fellowship ; or should we regard the super-atom as itself the product of ascending evolution ? It may be said that of ascending evolution in atoms we have as yet no direct evidence. But it may be that the nature and origin of radiation is such as to enable it to yield direct evidence of dissolution rather than evolution in the atomic series. I take it that, with respect to our question, the strictly scientific answer is : We do not know.

But when we take the next step upwards in our hierarchy, and at each further step onwards, it seems that, on this earth at least, evolutionary ascent in fellowship is in all cases prior to dissolution of fellowship. And if it be said that this earth is only a speck in the cosmic universe, what of that ? It is just in that speck that evolutionary advance to the higher planes of our hierarchy swims into our ken and calls for interpretation. What may happen of like order in sundry other specks we do not know. For us, at any rate, our thought of nature is geocentric, if not anthropocentric, or even ultimately egocentric, in its locus of origin.

My aim has been to consider some of the implications of an organic theory of nature. What are they ?

Our attention has chiefly been centred in the organism under the expository notion of fellowship. It is an implication of this theory that the plan, the structure, and all the characters of the organism, fall within the comprehensive domain of nature : and that the status of any given organism is determined by the mode of fellowship that obtains therein.

We had, however, to advert to the distinction between evolution and dissolution of fellowship. Subject to this distinction, it is *not* an implication of an organic theory of nature that the status of an organism is wholly the outcome of evolution in modes

of fellowship. The status of an organism, as things now are, may be the outcome of the dissolution of already existing fellowship. Such, for example, near one end of the scale, may be the status of an atom; such, at the other end of the scale, may be the status of a man in social regard. In all the more complex organisms evolution and dissolution may proceed side by side in respect of its constituent members. This necessitates the analysis under which anabolic and katabolic processes are distinguished, and the further analysis into the building up and breaking down of the molecules in fellowship within some tissue of the living organism.

My reiterated plea is for adequate analysis, followed in due course by synthesis in which we may re-envision the concrete. Hence we had to draw a distinction between an organism as resultant and an organism as emergent. Resultant advance has long been recognized. Emergent advance has only recently received due emphasis at the hands of Professor Alexander, and others. On this type of advance I laid stress when I spoke of the emergent hierarchy. In this section I have tried to show that the distinction between resultant and emergent is not merely whimsical, but is comprehensible in terms of deduction. Have I succeeded in showing that it is *not* an implication of an organic theory of nature that all evolutionary advance is of the emergent type? Have I succeeded in showing that, if this be so, we must disentangle, under analysis, the emergent web from the resultant woof? No doubt there are difficulties, since certain statistical net-results and mass-effects of emergence seem to be susceptible of deduction on resultant principles. Does not this emphasize the need for fuller and more searching analysis?

Should we not apply such analysis in the field of motives? Some say that the strongest motive prevails. Apart from the circularity of the statement—for it is said, too, that the prevalent motive is the strongest—is not this tantamount to asserting that all conduct under motive is resultant, and resultant only? With-

out denying that there is much which is deducible in human conduct, may not adequate analysis disclose also sundry not-deducible factors of the emergent type? May we not thus find something new and distinctive of a highly evolved mode of human fellowship—something that could not, as resultant, be predicted from what is given at some lower level of emergence?

Now, frankly admitting that the word “fellowship”—though it is the best I can find—may, perhaps with advantage, be replaced by a better word, I submit that the *notion* it is intended to express, does bring out what, for me, is an implication of an organic theory of nature. But it is a notion that is explicative of our extended concept of the organism. It is applicable to organisms in a hierarchical series as emergent. It is applicable also, in a liberal sense, to such a resultant as the solar system. It is applicable to stars, to ant-communities, to human societies, as joint products of evolutionary advance both resultant and emergent. It emphasizes that to which we may give alternative expression when we speak of the organism as a community of members in fellowship, or of fellowship as a characterizing feature of the organism.

In this sense, then, an organic theory of nature offers an interpretation of the organism. Is it therefore an implication of such a theory that it deals with organisms only? For me this is not implied. The theory purports to deal with nature as a whole. If it were one that is concerned with organisms only, would it not follow that nature as a whole is an organism? But is it, so far as we can form an opinion, an organism? Are there adequate empirical grounds for entertaining the hypothesis that nature as a whole conforms to our concept of the organism?

It is legitimate to apply the notion of fellowship, as characterizing any organism so far as this may be justified by the empirical evidence to hand, and so far as it conduces to further investigation and interpretation. But in practice the noun should be used

with adjectival qualification—atomic, molecular, vital, social, and (I should add) spiritual fellowship. But, so far as I can judge, the empirical evidence up to date does not justify the extension of the notion of fellowship, in the same sense, to the whole of nature. If that be what Holism means, I, for one, cannot subscribe to this cardinal article in its creed.

Of course it may be said that, throughout nature, each event or cluster of events—and therefore each organism—plays its part in relation to the parts that all others are playing. That is an implication of an organic theory of nature. But, in nature as a whole, are these relations so integrated as to give a community of members in a specific mode of fellowship which we can indicate by the use of a clearly distinguishing adjective? I leave it in the form of a question.

It seems to me that there are some branches of scientific inquiry in which attention is concentrated on the organism in our extended sense of the word. But there are other fields of research where the attention is chiefly directed to the transactions that take effect between organisms. In the former, stress is laid on intrinsic relations within that organism which is selected for special consideration—the molecule, the living cell, and so on. In the latter, extrinsic relations—say, those that obtain when physical influence is transmitted from this organism to that—receive due emphasis. This is, however, only a partial division of labour. One cannot follow the matter up any further in a paper already too long. But it is clear that an organic theory of nature is no respecter of sciences. All furnish grist to its mill.

This only need be added. In discussing a concept of the organism and some of the implications of an organic theory of nature, I have tried to steer clear of the implications of any Theory of Reality which may bear on an organic theory of nature, or on which that theory may have bearing. Subject to the

distinction that I drew on p. 154, Creativity should be discussed as an issue beyond the purview of *this* discussion. For me it is the liveliest of live issues. But for me its point of insertion is not at this, that, or the other critical turning-point in the emergent hierarchy. If present at all, it is omnipresent. It sheds light on all that generalized science may have to say on an organic theory of nature and on a concept of the organism.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on February 21st, 1927, at 8 p.m.*

VIII. SPINOZA'S CONCEPTION OF THE ATTRIBUTES OF SUBSTANCE.

By A. WOLF.

§ 1. *Foreword.*

As this is the two-hundred-and-fiftieth anniversary of the death of Spinoza, it is but right that the Society should devote the evening to the consideration of some aspects of his philosophy. This is all the more desirable in view of the difference of opinion, not to say confusion, still prevalent about the interpretation of his works. It may seem amazing that two hundred and fifty years after the author's death his works should still be subject to very different, inconsistent interpretations. But so it is. Even more surprising, perhaps, is the fact that criticism of Spinoza's philosophy has not been delayed thereby. Or is this the explanation of the Babel of interpretations? Are people in such a hurry to criticize Spinoza that they do not take the necessary time and trouble to understand him? It certainly does seem strange that after two-and-a-half centuries of study the very foundations of Spinozism should still be subject, not merely to conflicting *criticisms* or *estimates*, but to conflicting *interpretations*. No doubt Spinoza is an uncommonly difficult writer, and his use of terms in senses rather different from their

then usual meaning, to say nothing of their present meaning or meaninglessness, helps to complicate matters. Moreover, he was a recluse with entirely insufficient incentive to make himself easily intelligible. After all, there are lots of professional teachers who remain unintelligible, even after decades of daily contact with searching undergraduates. No doubt also his thoughts are difficult, quite apart from their expression. But when all such allowances have been made, it still seems to me that some of the misinterpretations of Spinozism are really inexcusable. They are largely due to a certain lack of patient determination to find out what Spinoza really meant, a proneness to view his philosophy through Cartesian, Kantian, Hegelian, or other coloured spectacles, and, above all, to an excessive haste to criticize.

In the present paper I propose to deal briefly with a few misinterpretations, all of them relating mainly to Spinoza's conception of the Attributes of Substance, which is the very foundation of his philosophy. It is obvious that once the fundamental ideas of a system of philosophy are misunderstood, the rest is inevitably distorted. Yet, putting aside for the moment the question whether the fundamental conceptions of Spinoza do or do not commend themselves to us, it seems to me that there is no real reason for regarding them as obscure, or for justifying some of the interpretations which have been put upon them and which still have considerable vogue.

§ 2. *The Relation of the Attributes to Substance.*

I begin with one of the less prevalent misconceptions concerning the relation of the Attributes to Substance. The

elucidation of this point may be helpful in connection with the subsequent topics, but need not detain us long.

Spinoza's real view seems sufficiently clear. Substance (or Nature or God) is the unified totality of Attributes. This seems clear from such passages as *Ethics* I, iv, Dem. ("substances, or, what is the same thing, their attributes"), and I, xix ("God is eternal, or, in other words, His Attributes are eternal"). In his earlier writings (*Letters* II, IV, IX) he defined Attribute in the same way as Substance, and a survival of this usage is met with in *Ethics* I, xv, Schol. ("extended substance is one of the infinite attributes of God"). The only difference between the Attributes and Substance is that our intellect can by an act of abstraction think of one of the Attributes apart from the rest, whereas in reality all the Attributes are inseparably together.

Unfortunately, for some of his readers, Spinoza had an interest in etymologies, and occasionally went out of his way to give the etymology of the word Attribute. *Attributum*, he explains, is connected with the verb *tribuere*, and an *attribute* is so called because the intellect *attributes* it to substance as one of its characteristics (*Ethics* I, ix, etc.). These etymological excursions have given rise to a kind of Kantian interpretation of the Attributes. According to J. E. Erdmann (*Grundriss der Geschichte der Philosophie*, Band II, Edition 1878), the Attributes were not regarded by Spinoza as real, objective characters of Substance, but only as our (subjective) ways of conceiving it. This kind of interpretation may seem plausible so long as one confines his attention to *Ethics* I, Definition iv ("By attribute I understand that which the intellect apprehends of substance, as constituting its essence"). But it loses every vestige of its plausibility the moment one takes other passages, and Spinoza's other doctrines, into account. According to Spinoza, the intellect (unlike the imagination) gives real knowledge, or

knowledge of the real. It is therefore entirely unwarranted to read into Spinoza the distinction between what a known Attribute is *realiter* and what it is *in intellectu*.

The question may, of course, be raised whether Spinoza was really justified in conceiving all the Attributes as constituting one only Substance. There is, however, no reasonable doubt that he did so regard them.

But it is unnecessary to elaborate this point, as hardly any English writer has adopted Erdmann's Kantian interpretation of Spinoza's Attributes. Assuming, then, that for Spinoza *Substance* and *the totality of Attributes* were identical, we may pass on to the next problem, which is much more serious.

§ 3. *The Alleged Logico-Mathematical Character of the Attributes.*

One of the commonest and most serious misinterpretations of Spinoza's thought is that which maintains that ultimate Reality (i.e., God or His Attributes) was regarded by Spinoza as logico-mathematical in character, not dynamic. In other words, it is maintained that when Spinoza speaks of causes and effects he really means grounds and consequences. This interpretation owes its vogue mainly to W. Windelband, who finds the essential feature of the philosophy of Spinoza in its *mathematical* pantheism. Windelband's view that Spinoza conceived of the Attributes as non-dynamic in character seems to be shared more or less by all English expositors of Spinoza. Yet it seems to me entirely unwarranted, a sheer travesty of Spinozism.

The unsophisticated reader of Spinoza cannot fail to be impressed by the dynamic terminology to be found throughout

his writings. For example, Spinoza maintains that it is as impossible for us to think that God does not *act* as that He does not exist, and God's essence is accordingly identified with the *power* by which He and all things are and *act* (*Ethics* I, xvii, II, iii, etc.). Similarly with the Attributes. Already in the *Short Treatise* (pp. 34 and 120 of my Translation) we find Thought and Extension described as *powers*, and the same view is expressed in the *Ethics* (II. i, vii and xxi). In fact, throughout his writings Spinoza lays stress on the identity of essence or reality with power or activity. To quote but two passages, let me give one from the *Short Treatise* (p. 146) and one from the *Ethics* (V. xl): "The more essence a thing has, so much more has it also of activity"; "the more perfect a thing is the more reality it possesses, and consequently acts more."

Prima facie Spinoza's philosophy is essentially and characteristically dynamic. Yet Kuno Fischer appears to be almost the only important exponent who interprets the Attributes as *Forces*; and even his interpretation of the relation of the Attributes to Substance is not satisfactory.

When we pass from God (or Substance or the Attributes) to the Modes (from *Natura naturans* to *Natura naturata*), then Spinoza's dynamic conception is so undeniable that extremely few have ever seriously ventured to interpret it otherwise. This fact might have made people pause to re-consider their non-dynamic (or purely logico-mathematical) interpretation of the Attributes. But no, the fact is only made an additional reason for adverse criticism, for the critics naturally cannot see how Spinoza could conceive of a dynamic world of finite objects or events as emerging out of merely logico-mathematical Attributes!

Now to my mind, the purely logico-mathematical interpretation of Spinoza's Attributes is a gross misinterpretation, and

is unjust to Spinoza in two ways. It cheats him (unintentionally, of course) of one of the most original features of his philosophy, and having committed one blunder, it caps it with another, by accusing him of inconsistency in deriving dynamic modes from non-dynamic Attributes.

Needless to say, the interpretation in question is not a wilful misinterpretation. There are reasons for it. But I will endeavour to show that the alleged reasons do not really bear out such a non-dynamic interpretation.

The reasons by which the logico-mathematical view is defended are two in number, so far as I know. They are these: (1) In a number of passages (e.g., *Ethics* I., xi: IV. Preface) Spinoza uses the phrase *cause or reason* (*causa seu ratio*): (2) Spinoza's illustrations of causal connections are mainly geometrical in character (the properties of the triangle, circle, etc.). From the first of these (1) it is argued that for Spinoza *cause* was synonymous with *reason*. From the second point (2) it is urged that just as the interrelations between the properties of geometrical figures are not really causal, but logico-mathematical, so the cosmic relations, which Spinoza tried to illustrate with the aid of the geometrical examples, must have been conceived by him as standing in logico-mathematical, not in causal relations.

(1) Now, the first of the above reasons seems to me to be almost frivolous. There are plenty of occasions when the strongest believer in dynamic causality may correctly use the phrase "cause or reason." After all, the knowledge of any causal relationship may function as a reason—any *causa essendi* or *causa fieri* may become a *causa cognoscendi*. So that the use of the phrase *cause or reason* does not necessarily imply that the writer intends to abolish the distinction between a dynamic cause and a logical reason. I can see nothing in

Spinoza's use of the phrase to warrant the view that he meant to identify the terms *cause* and *reason*. Take, for instance, *Ethics* I, i, in which the phrase occurs several times, though one example will serve our purpose. He there says: "For everything there must be assignable a cause or reason why it exists or does not exist." This simply means that if anything exists then there must be, or have been, conditions which produced it, and if something does not exist, then there must be conditions which prevent its existence; and, of course, if we know these causes, then we have the reasons, though there are also reasons which are not causes.

(2) I turn to the second of the reasons given in justification of the logico-mathematical interpretation of the Attributes—namely, the frequent use of geometrical illustrations. The assumption invariably made is, that the relation between the properties of geometrical figures can by no manner of means be regarded as causal. The very suggestion of another view would probably be enough to shock most teachers of philosophy. I propose to say something on this head presently. But let us suppose, for the moment at least, that the usual assumption is correct, that the properties of geometrical figures stand in so-called logico-mathematical relations to each other, not in causal relations. Even so, I would maintain that Spinoza's use of geometrical illustrations does not warrant the conclusion that he recognized no other relations, more particularly causal relations. It is a familiar fact that illustrations, like metaphors, must not be pressed too closely, because they are usually only intended to bring out some special point or points, and are not meant to resemble in every respect that which they are used to illustrate. This is only too obvious in the case of metaphors, but metaphors are only a kind of illustration. It is necessary to be cautious not to read too much into illustrations, or to deduce too

much from their use. Now Spinoza's geometrical illustrations, I venture to say, always have a very real significance, even if we ignore entirely their alleged logico-mathematical character. What he usually wants to illustrate with their aid is the prevalence of necessary law (as distinguished from arbitrary caprice or contingency), or of immanent causality (as distinguished from transeunt causality), and the like. I can see no reason for supposing that he intended them to illustrate logico-mathematical relationship as opposed to causal relationship, and that he meant to deny the reality of causal relationships. The trouble which he took in the *Short Treatise* and in the *Ethics* to explain the different kinds of causes rather tends to show that he did not really propose to swamp them all in the logico-mathematical relationship.

I conclude, accordingly, that the case for the logico-mathematical interpretation is "not proven," and that there is no valid ground for explaining away Spinoza's dynamic terminology. It appears to me that the philosophy of Spinoza is essentially dynamic in character, that is to say, his conception of Reality is emphatically that of a dynamic Reality. This is a very original and very important feature of his philosophy. And it is only the rather persistent, wrong-headed attempt to make him a mere Cartesian that is largely responsible for the misconception or neglect with which this side of Spinoza's philosophy has met.

§ 4. *The Dynamic Character of Reality according to Spinoza.*

That Spinoza regarded the universe as something essentially dynamic is made particularly clear if we compare his conception of the nature of Extension with the Cartesian conception of it. It is too commonly assumed that, because Descartes and Spinoza

both used the same term (Extension), therefore they both meant the same thing. But that is a grave mistake. For Descartes, matter was essentially Extension, and nothing else. Matter as he conceived it was inert by nature. One result of this conception was that he had to invoke a *deus ex machina* not only to create matter and to maintain it in existence by incessant re-creation, but also to impart motion and rest to it, and to keep this motion and rest constant in quantity. Altogether, the Cartesian philosophy not only treats God like an outsider, but works Him terribly hard in keeping this sorry scheme of things together. Essentially the Cartesian philosophy is like any of the familiar cosmogonies of the historic theologies, and is addicted to incessant miracles.

As a philosophy, Spinozism is, in my humble opinion, incomparably superior to Cartesianism. To Spinoza, the incessant cosmic wire-pulling by an external God did not appear to conform to the rules of the game, if I may say so. Spinoza endeavoured to conceive the universe as a self-sufficient, autonomous, and perfectly rational system, free from external interference, and free from arbitrariness or caprice. Accordingly, he strongly criticized the Cartesian conception of matter as mere extension and entirely inert. From such matter, he maintained (Letters LXXXI and LXXXIII), the material universe could not possibly evolve. True, as Tschirnhaus reminded him, Descartes supposed that God added the necessary motion and rest to set things going: but the assumption of such miraculous external interference was just what appeared unphilosophical to Spinoza. Spinoza's conception of matter was dynamic from the very outset. He retained the Cartesian term Extension because the name indicated the difference between Matter and Thought, which Spinoza likewise conceived dynamically. What Spinoza means by Extension is really what may

be called Physical Energy, which expresses itself in the infinite mode of Motion and Rest, which consequently need not be introduced miraculously from outside the material world. It may be pointed out here that the dynamic interpretation of Extension makes the relation of Motion and Rest (or energy of motion and energy of position) to Extension intelligible; the logico-mathematical interpretation makes nonsense of it. For how can Motion be logically derived from Extension? Motion implies Extension; but Extension does not imply Motion. If, therefore, Spinoza admitted only logico-mathematical relations, then Motion should have been the Attribute and Extension its mode. Presumably he knew what he really meant, and said it. And what he did say, already in the *Short Treatise* (p. 120), was that Extension is "the power to produce" Motion and Rest (or kinetic and potential energy, as we might say).

The subsequent history of science has abundantly justified Spinoza's dynamic or kinetic conception of matter as against the inert conception of matter held by Descartes and all his contemporaries as well as some of the most distinguished successors. Descartes, for instance, could only explain the movements of the planets by invoking, not only the aid of God, but also the machinery of æther vortices to carry the planets. Even Newton could not do without the æther, and for much the same reason. But after Newton's formulation of the law of universal gravitation, a marked change came about in the scientific world. In spite of Newton's opposition to it, the view generally accepted, and actually advocated by Cotes in his Preface to the second edition of the *Principia*, was that gravitation is inherent in matter as such, so that the motion of matter need not be accounted for by reference to external agencies; only changes of motion (in direction, etc.) need be accounted for in that way. Since then till the present day, the kinetic conception of matter has grown so much

in favour that "matter" has almost been displaced by energy or "fields of force," an expression that may well remind us of Spinoza's conception of a dynamic Extension. Of course, I do not for a moment desire to claim for Spinoza the credit for the new physical conceptions. But I think that he deserves great credit for having suggested so long in advance a metaphysical basis for these modern ideas in Physics.

The other Attribute or Attributes were likewise regarded by Spinoza dynamically. He repeatedly refers to Thought as a power (*potentia*). It is, one might say, Mind Energy, just as Extension is Physical Energy. This naturally involved a dynamic conception of the modes of Thought. And so we find Spinoza protesting against the view which prevailed in his time and long afterwards that ideas are like "mute pictures on a tablet" (*Ethics*, II, xlix, Schol., and compare Def. iii, Expl.), and maintaining, on the contrary, that they are active thoughts or assertions. Having regard to the *tabula rasa* view, and the passive sensationalist psychology, which dominated European thought over such a long period after the time of Spinoza, it was surely no small matter that by his insight he anticipated the dynamic tendency of present-day psychology as well as of present-day physics. In my view Spinoza's consistently dynamic conception of Reality is one of the most remarkable and most creditable features of his metaphysics.

This brings me to the consideration of a point to which allusion has already been made before, namely, the significance of Spinoza's use of geometrical illustrations. I contended before that even if the usual conception of the purely logico-mathematical relations between the properties of geometrical figures were the only one conceivable, so that Spinoza could take no other view of them, even then it would not follow that Spinoza intended his illustrations to be interpreted as a denial of causal or dynamic

relations. But now I would go a step farther and maintain that his favourite way of regarding things dynamically manifests itself even in his attitude towards geometrical figures. His favourite way of defining such figures was by means of *genetic* definitions, that is, descriptions of their construction, and such definitions are essentially dynamic. This is perfectly clear from his account of the best definition of a circle in Letter LX, where he says that "a circle is a figure described by a line one point of which is fixed while the other is revolving." And he says that he prefers this definition to other possible definitions just because it expresses the *efficient cause* of the object defined. (Compare the *Treatise on the Improvement of the Understanding*, near the end.) We may suppose, accordingly, that a triangle was regarded by Spinoza as the figure produced when three straight lines (of which any two are greater than the third) are joined in such a way as to enclose a space. By moving these lines about (actually or in imagination) it could be shown that the sum of the three angles must be equal to two right angles, and so on. In so far as Spinoza thought of geometrical figures after this fashion, his use of geometrical examples, instead of confirming the logico-mathematical interpretation of his philosophy, would rather tend the other way.

§ 5. *The Number of the Attributes according to Spinoza.*

The Attributes of God, or Substance, are, according to Spinoza, not only each infinite in its kind, but they are also infinite in number, although only two of them (Thought and Extension) are known to human beings. Spinoza's argument is, briefly, this. Only nothing has no attributes. To be real a thing must have

attributes ; and the more reality it has, the more attributes it must have. Consequently, God or Substance, the Infinitely Real, must have infinite attributes.

Commentators, not unnaturally perhaps, speak of the *immutable* Attributes of Substance, according to Spinoza. And they are not at all happy about this infinity of Attributes. It is commonly regarded as spoiling the harmony or parallelism of the whole scheme. If all the Attributes are concurrent or parallel natures of one and the same Substance, which they constitute, then *prima facie* each mode might have been expected to manifest this infinite-sidedness, as a manifestation of the infinity of Attributes. But that does not appear to be the case. Even human beings appear to express and to know only two Attributes—Thought and Extension. Then, again, in the *Short Treatise* (Appendix II, p. 159), Spinoza maintains that not only has each mode of Extension its mode of Thought, or soul, but the modes of every other Attribute (that is, other than Extension) have each its soul or idea (that is, a mode of Thought). If so, then the Attribute Thought appears to have a privileged position among the Attributes: instead of being parallel with one Attribute (like Extension with Thought), it seems to be co-extensive with *all* the other Attributes.

Such are the difficulties which the commentators feel about the infinity of Attributes which Spinoza alleges. The critics feel that Spinoza was logically compelled to assume an infinity of Attributes, for the reasons briefly indicated above, and that, nevertheless, it does not fit into his scheme, but creates difficulties.

Now, in the first place, I do not attach any importance to the alleged difficulties. Spinoza nowhere speaks of the parallelism of the Attributes, and even if he did, it would surely be a gross instance of abusing a metaphor to suppose that he intended any sort of spatial co-extensiveness of the Attributes, whatever

that may mean. All that he insists on is that each Attribute is infinite (that is, complete) in its kind, and it is surely absurd to try and measure the infinities of different Attributes against each other. Nor, again, can I see any cogent reason for supposing that an infinite-sided mode must needs be self-conscious of its infinite-sidedness. Man, for instance, might be more than he knows. I may return to this point presently.

But what I want to bring out more particularly is that in my view the whole doctrine of an infinite number of Attributes has really been misconstrued by all the commentators and expositors. It is true, of course, that Spinoza does speak of God or Substance as "consisting of infinite Attributes" (*Ethics*, I. xi. for instance), and that "infinite" in this phrase refers to the number of the Attributes, and not merely to the fact that each Attribute is infinite in kind in itself. But it is a sheer blunder to translate Spinoza's *infinite* by *innumerable*. And it is this mistranslation that is at the root of the trouble. By *infinite* Spinoza means *complete* or *all*. Again and again Spinoza insists on his positive use of the term *infinite*: and again and again he uses *perfect* (i.e., complete) or *all* as the equivalent of *infinite*. Thus, for example, in the *Short Treatise* (I. ii. p. 21) he describes God as "a being of whom all or infinite attributes are predicated." Now, nobody could think of describing two attributes as *innumerable* attributes, but they may well be *all* the attributes. What I contend is, that Spinoza did not posit innumerable attributes at all. He only knew of two Attributes, and as a cautious thinker, he had, of course, to allow for the possibility of other Attributes unknown to man, since Spinoza did not regard man as the measure of all things. He accordingly posited "infinite or all the attributes," in the sense of "certainly two, possibly more." My interpretation of Spinoza's meaning is, I think, borne out to some extent by what he says in *Ethics* III. ii. where, referring to the mutual relations

between the modes of the different Attributes, he says: "The body cannot determine the mind to think, nor can the mind determine the body to motion or rest, nor to anything else if such there be." The expression "anything else" may refer to some mode of extension other than motion and rest. But the last part of the sentence may be a rather awkward way of stating that the mode of no other Attribute can be determined by a mode of Extension or of Thought, just as a mode of Extension and a mode of Thought cannot determine each other. In any case, whether this latter interpretation of *Ethics*, III, ii, be possible or not, there can be no doubt about Spinoza's use of the term *infinite*, on which I base chiefly my view of his conception of the number of Attributes.

For Spinoza, then, as I understand him, there *may be*, but there need not be more than two Attributes, and what he says about the limitation of each mode of Thought to the apprehension of the mode of only one other Attribute (Extension, for instance, in our case), has reference to the possible case of there being other Attributes. In other words, if there really are other Attributes than Extension and Thought (Spinoza may be understood to say), then the fact that our mind apprehends only its own Attribute and that of Extension, and not the modes of any of the other (to us unknown) Attributes, must be due to the fact that each mind (or idea) is so constituted as only to know one other Attribute besides its own, namely, the Attribute of its *ideatum*, which may be a mode of a different Attribute in different cases.

§ 6. *Afterword.*

This paper gives but a brief account of some of the interpretations of Spinoza's fundamental concepts which seem to me to be palpable misinterpretations. The account may suffice to show

the need of a really close study of Spinoza, and the advisability of postponing criticism until we can be tolerably sure of the accuracy of our interpretation of him. I think that a close study of Spinoza is eminently worth while. Unless I am very much mistaken, the philosophy of Spinoza is more in harmony with present-day scientific thought, to say nothing of social and political thought, than any other philosophy since his time.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on March 7th, at 8 P.M.*

IX.—THE FUNCTION OF EXPERIMENT IN KNOWLEDGE.

By J. MACMURRAY.

EXPERIMENT is the life of science. I doubt if any scientist would seriously challenge this statement. Whether or no, it is in this belief that I propose to examine the function of experiment in knowledge, and the examination will involve some discussion of the distinctive characters of scientific method. Now, in its most proper sense, experiment is practical. It involves doing things, physical things. If, then, experiment is of the essence of science, and science is a method of discovering truth, then science is a method of discovery in which overt practical activity plays an essential part. This seems to be the important feature of scientific method, the character which distinguishes science from all other methods. Others rely on simple observation, on intuition, on logical demonstration, or on a combination of these. Science uses all these, but insists that they are valueless for its purposes unless functionally supplemented by practical activity.

This insistence on supplementing the ordinary cognitional activities immediately suggests that there underlies all scientific procedure a profound scepticism of these. In themselves, they are inadequate instruments of discovery and proof. To know we must act as well as think and perceive. Science is based on a double scepticism. It is sceptical of the validity both of pure thought and of sense-perception. It will not accept as final

the most rigid logical demonstration, nor will it be satisfied with the best-attested facts of observation. To these it insists on adding experiment before the results can be admitted to the body of scientific knowledge. As these statements may seem paradoxical, some explanation and some further evidence are necessary.

That scientists are sceptical of logical demonstration is sufficiently shown by their general attitude to philosophy, and by their reverence for "facts." Their attitude to philosophy may be hostile or it may be tolerant, but it never welcomes the intrusion of metaphysics into the domain of science. There, all efforts are made to get rid of "metaphysical entities," as far as may be, and—this is the antithesis—to remain at all points in touch with what can be experienced. What is objected to is not abstraction, but the inclusion in scientific theory of such abstract entities or propositions as satisfy theoretical demands only, and are supported by merely theoretical evidence. "An ounce of fact," says the scientist, "is worth a ton of theory." Into the processes of logical demonstration there enters a subjective factor which renders it suspect. Its mediacy has proved a snare in the past, and may prove a snare again. He will not trust it. It might be thought that this simply means that the scientist recognizes the fallibility of the human instrument, and wishes to guard against it. But though this is part of the reason, it is not the important part. It is not merely logical fallacy of which he is suspicious, but logical thought. He claims the right to maintain side by side two mutually exclusive theories of radiation, on the ground that each is experimentally verifiable in a particular region. He is prepared to examine sympathetically a view that involves the displacement of electrons from one position to another without their passing through the intermediate space. In defiance of the logical structure of his body of knowledge, he is prepared to assume that an electron can

revolve around its nucleus without loss of energy. The most rigid deduction from his most cherished hypothesis must challenge the test of experiment before he will admit its scientific validity. Thus, it is not the possibility of fallacious inference against which he is on his guard, but the possibility of being misled in his search for truth by trusting to the adequacy of logical deduction.

The scientist is inclined also to press the point that logical deduction must proceed from some assertion of fact, from some deduction not itself proved. This datum must either be a fact of observation or an *a priori* axiom, a self-evident truth. But he has become exceedingly sceptical of this so-called self-evidence. So often has he found that the self-evident character of an axiom rests upon obstinate prejudice, that he is prepared to treat all axioms as merely unchallenged assumptions, fundamental hypotheses. The "inconceivability of the opposite" may rest upon temporary and subjective conditions. Our categories may simply be ingrained habits of thought. Even the law of contradiction, so far as it is certain, is quite empty and useless. For it does not enable us to distinguish between apparent and real contradiction. This scepticism of deductive logic as an instrument of knowledge applies equally to logical induction. The scientist of to-day is acutely aware of the necessary limits of generalization from observed facts. At a time when even the law of gravitation has come into question, and has at least been shown to be an over-generalization, entirely unavoidable at the time at which it was made, he is not likely to trust to the validity of induction. We find him ready to confess, indeed to insist, that the best-established generalizations of science are, after all, only highly probable hypotheses.

Science, then, is characterized by a sceptical distrust of logical processes as such, and in opposition to philosophical speculation, insists that facts and facts alone can be the basis of the knowledge

it seeks. But we would be but poor philosophers if we allowed ourselves to be misled by this insistence upon observation of fact, upon sense-perception, into the belief that science accepts a realist theory of knowledge, and supposes that sense-data are the immediate certainties which certain philosophers maintain them to be. For, in truth, the scientist is just as sceptical of observation as he is of logic. His insistence upon facts has a very natural and obvious origin. It comes of the prolonged struggle for existence which science has had to wage with religious and philosophical dogmatism, which bases itself always upon *a priori* intuition and logical demonstration. If, however, we examine the scientist's practice, we find that he is exceedingly critical of observation. He has built up an elaborate technique of observation, a system of checks and counter-checks to eliminate the intrusion of subjective factors. He relies upon the bare use of his senses as little as possible, and balances observation against observation, and one observer against another. Even then he calculates carefully the degree of accuracy which he thinks he can expect. But this is not all. There are vast masses of observation, careful and painstaking, which he refuses to consider and views as suspect. The mass of evidence described as psychical phenomena, and published in the volumes of the Society for Physical Research, he either pooh-poohs or disregards. Yet it would seem to have a *prima facie* bearing upon many of his theories about the material world. Indeed, he is always extremely sceptical of any alleged fact which is in logical contradiction with his scientific theory. Whereas before we found him setting fact against theory, we now catch him setting theory against fact. Is the scientist simply inconsistent, or is there some reason at the basis of this seeming vacillation?

Now the scientist's aim is theoretical knowledge, not knowledge of detailed fact. It follows that isolated facts of observation are of no consequence to him unless they have some direct

bearing upon the special questions upon which he is engaged. An accidental observation may, to a mind already familiar with a body of theoretical generalisation, suggest a modification of the theory. But this is rare. If it happens, the accidental observation has in itself no standing. It must be repeated under conditions in which it is no longer accidental, but stands in conscious and deliberate relation to a question based upon the theory in which its first accidental occurrence suggested a modification. This seems to be the reason why masses of observation are negligible from the scientific point of view. Either they cannot be brought into direct relation to scientific theory at all, or it is impossible to repeat them in such a fashion that they answer a question based upon scientific theory. Observations must be relevant, not merely relevant to the particular question in mind, but more especially to the stage which theory has reached in its continuous development.

All this is vague enough. Let me, therefore, attempt to state explicitly the theory of science which underlies it, for it seems to me to differ in important respects from current accounts of scientific method. In the first place, science is based upon scepticism, not upon a scepticism of *a priori* thought which takes refuge in the immediate data of sense-perception, as is often supposed, but upon a thorough-going scepticism both of logical demonstration and of immediate experience. This implies that there are no items of knowledge to which certainty attaches. The scientist is sometimes challenged by the philosopher on the ground that his facts are interpretations of observation, and have no superior validity as knowledge. No doubt the scientist's ignorance of philosophical analysis often traps him into statements which make this criticism a sound one. But in this way the philosopher can only score a verbal triumph. A scientific "fact" is always a fact in relation to theory, always a generalization. When the scientist contrasts

"fact," with "theory," he is contrasting a universal judgment well tested through observation with a universal judgment not so tested, and in this sense he surely has at least a *prima facie* case for trusting more to the tested than to the untested generalization. When he insists that "an ounce of fact is worth a ton of theory," he means that no amount of testing by pure logical analysis is as satisfactory as a few simple tests by observation. He may quite well admit that what is being tested is always a general statement, and therefore itself the product of logical activity. The effect of this is merely to reformulate the position that no scientific generalisation claims certainty, and therefore that science is based upon scepticism of a quite general kind.

Perhaps the scientist might point out that he means by a fact a verified generalization. The philosopher would then, in all probability, object that no process of observation can "verify" a general statement. The dispute again, it seems to me, turns upon an ambiguity. By "verification" the philosopher means "proof by demonstration," and in that sense it is obvious that particular observations cannot be advanced as proof of a general statement. But by verification the scientist need not mean more than testing. A general judgment can be tested by observation, though not thereby proved true. A satisfactory test will vindicate his right to retain his generalization within the body of theory which is his science; it can never exempt it from further criticism nor guarantee it against future modification in the interests of truth. In practice the scientist grants this, and in an expansive and unsuspicious mood he will grant it in theory as well. The admission amounts again to a frank confession of scepticism. Science knows of no sacrosanct judgments which are infallibly and eternally true. Even the axioms of mathematics are now questioned and treated as fundamental postulates, almost as the rules of a

conventional game, as hypotheses whose objective validity as knowledge can only have meaning in terms of the verdict of testing by observation. The certainty of mathematics is evidence not of truth, but of the absence of any objective reference.

Science, thus, it would seem, properly understood, makes no claim to offer us certainty at any point. It dissolves every judgment into a hypothesis, and retains throughout the sceptical temper which is its basis. Underlying its activity we can discern neither a realist nor an idealist theory of knowledge, since it is sceptical both of sense-perception and of logical thought as instruments of knowledge. Nevertheless, it professes to be knowledge, and often to be the only knowledge which is in any sense trustworthy. What can be made of its claims? Is it possible to make ignorance the basis of knowledge, to build truth upon an unshakable scepticism? Must we relegate science to the sphere of practice, as some have wished to do, and deny that it is really knowledge at all? This, of course, consists in giving science the lie direct, by denying its scepticism. If this challenge is to be made good, it can only be by producing a universal judgment which is necessarily exempt from criticism, which cannot, in the nature of things, be challenged when it is understood. This, it seems to me, is very difficult to do, if not impossible. I do not see how such a procedure is to be followed without involving a *petitio principii*. We cannot demonstrate by logical deduction where the validity of logical deduction is in question, nor can we assert a judgment as axiomatic where intuition is suspect. Nor is the old way with the sceptic of any avail. In asserting his scepticism he is not asserting truth. He is asserting ignorance. A sceptic is not necessarily an agnostic, for an agnostic is a dogmatist, and a sceptic is not. The agnostic affirms ignorance as a positive quality: the sceptic neither affirms nor denies; he doubts.

Let us not get side-tracked into abstract argument, but return to the nature and practice of science. Is there any possibility of making out a case for the scientist, of reconciling his claim to knowledge with his professed scepticism? Obviously this is impossible so long as we mean by knowledge any final certainty. Further, it is impossible so long as we remain strictly within the field of thought and observation, since both are suspect. But is there any need to remain within this limited field, and are we necessarily right in thinking that knowledge means certainty? The scientist does not think so. By knowledge he means the life of deliberate cognition. In experiment he brings practical activity to supplement the limitations of mere thinking and mere observing. To the formulation of the theory which this possibility opens up we must now proceed.

Science comes into being as the criticism of beliefs. It rests, historically and in its nature, not upon the observation of facts, but upon the existence of beliefs which, from whatever cause, are losing their hold upon the minds of men. It is essential that the belief which is being subjected to doubt should be a real belief, a serious claimant to truth. It is not necessary that it should be true, nor that it should be able to advance reasonable grounds for itself. It may be held on authority or asserted as an axiom; it may be the result of logical inference, accurate or fallacious; or merely a widespread conviction which has grown up, as beliefs do grow, without any remembrance of its origin, or any conscious recognition of its grounds. Similarly, the doubt about its truth may be definite or vague, it may arise from a perception of inconsistency or from a feeling of its social harmfulness, or perhaps from mere boredom. The ground of the belief and the ground of the doubt of its truth are irrelevant. Under these conditions a belief can neither be affirmed nor denied. To reject it without solid grounds is as irrational as to accept it. It must therefore be entertained, but in an attitude of critical sus-

picion, and if it is to be admitted at all into scientific activity, there must be added to this a deliberate effort to discover grounds for its acceptance or for its rejection. Thus science appears as a deliberate effort to discover grounds for the acceptance or rejection of beliefs which are entertained hypothetically.

How is this purpose to be realized? How are we to substitute, for the mere fact of belief, beliefs which we affirm on reasonable grounds? When we examine this question systematically, we find that no belief stands alone, that it forms part of an elaborate system of interconnected beliefs, that to accept one belief is to accept others, to reject one is to reject others. Thus to cast doubt on a belief is to implicate in this doubt the whole system of belief of which it forms part. Now the interconnection of beliefs in this way is primarily *de facto*. It is a "felt" relation rather than an argued relation. For example, in the latter half of the nineteenth century it was widely felt that the rejection of the account of the creation given in the first chapter of Genesis involved the rejection of the whole system of Christian belief. That this feeling of interconnection was in some sense erroneous we should all agree. It is obvious, then, that one side of the task facing the scientist is the effort to systematize beliefs, to discover which beliefs do rationally imply one another. This work is essentially logical and deductive. It involves an ideal of logical coherence, an explicit formulation of logical categories, and a prolonged effort of clear and critical thinking. But it is, within its own sphere, independent of the truth of the beliefs which are systematized. In saying "within its own sphere" I mean that this development of systematic interrelations of belief in clear consciousness does not in itself bring us any nearer to the determination of the truth of any belief in the system. We may, of course, find that the belief which we started by doubting implies a belief which we feel certain is true. But it is precisely this "felt" certainty which we wish to get away from. If our

effort is to substitute for the fact of belief a rational ground of belief, then it is a fundamental principle that no belief can be its own criterion. The result of the development of an understanding of the logical interconnection of beliefs in a system is simply to transfer the doubt which attaches to any one of the beliefs to the system as a whole, and to infect with doubt every belief which is implied in the one under criticism. The development of the knowledge of interconnection, the development of the theoretical understanding, is in itself the universalizing of scepticism. Of course, it is true that if one element in the system is certain and the implications are accurately known, then the whole system will be guaranteed. But the guarantee must lie outside the system and cannot in any sense be its own coherence. The question of its truth is still entirely untouched. For the settlement of that question we must look elsewhere. It seems to me that this is the real basis of scientific scepticism, and that this is the source of its appeal to facts and to experiment. To appeal to experience is to appeal beyond the limits of the system of logical coherence.

This appeal, however, is not to chance observation, but to deliberate observation. Any system of beliefs has many points of contact with perceptual experience, and because of its systematic character it can be tested at many points. A belief involves the expectation of certain particular experiences, more or less definite according to the definiteness of the belief, under particular conditions. The belief that "bodies fall to the ground with a velocity proportional to their weight" means that if I drop two bodies of different weights from the Leaning Tower of Pisa, the heavier will be observed to strike the ground before the lighter. I can, therefore, test the belief by doing so. Here, then, we have the first element in the function of experiment. It is, if you will, controlled observation (though the phrase is ambiguous, and I should prefer to call it deliberate observation),

observation controlled by expectation based upon theory. It is putting questions to Nature. Observation which does not issue deliberately from a system of belief under criticism is not experiment, is no test of truth, and is quite irrelevant. What is essential is the deliberate comparison of what is actually observed with what, on the basis of defined and systematic theory, was expected. There is here no method of trial and error. Conditions must be precisely determined beforehand on a theoretical basis, and the expectation clearly defined. Only under such conditions can observation be a test of theory.

What does such experimental testing achieve? Certainly not the demonstration of theoretical truth. Even in making out a case for science we must admit that no particular observation, and no number of particular observations, can ever amount to a demonstration of the validity of a belief. Nevertheless, the continuity of experiment within the same system of articulated theory does replace the mere fact of belief by an increasing mass of definite, deliberate and interconnected observations as the basis of belief. The more clearly the logical articulation of the system develops, the more effective does this support become, since each separate observation supports the whole system. If this does not supply a demonstration of truth, it does supply a perfectly valid ground for an increasing confidence in our wisdom in entertaining these systems of belief. Deliberate experiment constitutes a criticism of fact, and provides the scientist with grounds for entertaining his hypotheses which have been deliberately and critically elicited.

This side of the question, however, though important, is not the most important. The vital result of experiment consists not in the confirmation of belief, but in the confirmation of doubt. Scientific development rests primarily upon those experiments which turn out contrary to expectation. We might almost say that the scientist experiments, not to prove his hypothesis true,

but to prove it false. Where a theoretical prediction is confirmed by experiment, no demonstration of truth is reached. But where the prediction is discrepant with the experimental observation, we do achieve a demonstration of falsity in the theoretical system. If experiment cannot vindicate the truth of belief, it can demonstrate its falsity. It is thus the perfect weapon of a science whose basis is sceptical and whose aim is the unmasking of ungrounded belief.

To draw the conclusion that such science must be merely destructive would be to ignore the fertility of the sources from which belief springs. To jettison belief is impossible, because its roots are hidden deep in the natural creativeness of the mind, and because it is maintained by the requirements of practical life. Nor is science under any obligation to jettison a belief which it has never affirmed except as hypothesis. Belief is from the first on its trial. Psychologically considered, belief is a spontaneous function of the mind, which has its own hidden laws of development. Imagination under control may replace one hypothesis by another, and the new hypothesis may in its turn be subjected to the same destructive criticism. What if the process of criticism could itself be made the instrument of replacement? What if experiment could be employed to harness the capricious fancy to a continuous and deliberate remodelling of hypothesis? The hypothesis, though never proved, is not on that account arbitrary. It is supported by masses of experimental observation, where its predictions were sustained, by the whole body of evidence which underlies the system of belief to which it belongs. Such a hypothesis, even though convicted of falsity by experiment, cannot rationally be supplanted by a theory which has no such support. The rival theory must have equal power of prediction in the cases in which the older hypothesis was confirmed. So soon as any theory has grown sufficiently to ground itself on a mass of interconnected observa-

tions, it can no longer be jettisoned, it can rarely be supplanted, it can only be modified under stringent conditions.

How is this to be secured ? In the first place the faulty hypothesis must still be retained as the theoretical instrument of experiment so long as no more adequate theory has arisen to take its place. It can be employed to elicit more discordances, and so to locate and define its own faultiness. The body of evidence against it can thus be multiplied. The implications of this growing body of discordant evidence can be examined and its implications elaborated, its connections traced. It can be collated with the strongly organised body of observation which forms the positive support of the ruling hypothesis. This collation of experimental fact constitutes, indeed, the major part of scientific activity. Yet its main importance is that it makes possible a deliberate use of the imagination in the effort to construct a new hypothesis, which while no longer subject to the refutation which was fatal to the old, is yet equally supported by the body of observation which formed the basis of the old. The new theory will then hold the field. It will supplant the old theory because it fulfils the same functions more adequately, and the conditions of its creation determine its continuity with the older theory. In turn, its implications must be worked out logically, the modifications which it implies in the whole system of theory must be elucidated, and the new body of theory is ready for the experimental criticism of which it is at once the instrument and the victim. In this fashion, through experiment, science has secured a deliberate continuity in the development of theory. Science, it would seem, has accomplished the impossible. It has made scepticism and negation the source of knowledge. The more thoroughgoing its scepticism, the more ready it is to accept open-mindedly the conviction of ignorance, the swifter and more deliberate does its progress become. By giving up the quest of certainty as an impossible task it has

succeeded in becoming the irresistible force which it undoubtedly is. It has made the failure of knowledge the instrument of success. In experiment, it has discovered its perfect method, the method of using practical activity to convict both theory and observation of their inadequacy. It is to be noted, however, that we can only maintain this conclusion by accepting a new view of the nature of knowledge. If science gives us knowledge, it does not give us certainty, and therefore, if knowledge involves certainty, science cannot be called knowledge. If we are to accept science as knowledge, we must re-formulate our conception of knowledge in the light of the considerations we have advanced. Knowledge will then be the life of deliberate cognition, the deliberate development through experimental criticism of a continuous body of theory, the unending effort to substitute, for the mere fact of belief, the deliberate acceptance of belief upon rational grounds. Continuity rather than consistency, deliberateness rather than conviction, are its criteria. This continuity of deliberate development is throughout secured by experiment, by taking advantage of the interrelation of logical implication and perceptual observation which is characteristic of practical activity. Science attains to this continuous life of deliberate theoretical development by giving up the pretence to certainty, which still characterizes most philosophical theories of knowledge.

This general conclusion raises two large issues which I should like to deal with, not fully, but by way of suggestion. It may be asked whether this theory, drawn from a consideration of experimental practice in the physical sciences, is really applicable to science in general. We may also enquire whether it can stand as a theory of knowledge in general, and include philosophy.

With regard to the first issue, I should myself insist that it is impossible to confine the term "science" to the physical sphere. Biology, geology and history claim to be sciences, and it seems to me that their claim must be respected. Science, as

I have described it, is a temper rather than an achieved body of knowledge, and I should be driven to confess that wherever this temper expresses itself, wherever there is an attempt to produce a deliberate and continuously developing body of theoretical cognition, to substitute for subjective conviction a constructive criticism of belief-systems through deliberate observation; wherever certainty is exchanged for continuity, there we have science. The point at issue will then be whether this is only possible through experiment, whether the sciences which employ the historical method are or can be experimental sciences. To this question I think I can reply in the affirmative, provided you will indulge me by permitting the use of the term "experiment" in a slightly Pickwickian sense, a sense which the discussion itself will, I hope, do something to justify. Let us narrow the question to what is undoubtedly the most difficult case, and ask whether history is an experimental science.

Now at least the scientific historian insists upon "facts" as much as the physicist, perhaps even more. On the other hand, his science seems often to approach a mere description of fact, or what is alleged to be fact, and nothing that can be remotely compared to a scientific "law" can be expected of him. The latter point is really unimportant. I see no reason why science should be expected to produce "laws" if it is to be science. Whether it can or cannot will depend upon its subject matter, and not upon its nature as science. The description of science which I have tried to outline leaves this question entirely open. On the other hand, it will be agreed that history is not mere chronicle, that its aim is not to give a detailed reproduction of the innumerable events which constituted the reality of any period of time. Its "facts" are not events as such, but events which in some sense are general and typical. It aims at understanding a period, not at chronicling it, and this effort involves the construction of a belief-system which covers the period in

terms of generalization and logical implication. In history, therefore, we can make a similar analysis. It commences, not with facts, but with a vague tradition, a system of uncritical belief about the life of a period. This it does not accept as true, but as so much assertion to be tested and modified. The tradition is its primary hypothesis. The tracing and unfolding of the logical interconnection of beliefs in terms of coherence and consistency is the theoretical side of its activity, but in itself is no criterion of truth. Its validity as knowledge must be supported from outside the system, and this can only be secured by an appeal from the coherence of theory to fact which is independent of it. Can this appeal take the form of experiment as we have described it? I think that it can and must. The essential point is that the facts which are to support the theory must be both independent of it and elicited in terms of it. The theory must suggest or predict that appropriate activity can produce observations whose nature can be defined beforehand in terms of the theory. These observations must be made, and the results of actual observation compared with what was expected. If this is possible, then experiment is possible, for this is the function of experiment.

There are three main forms which experiment takes in scientific history. The first is direct. A logical and imaginative analysis of Greek tradition enabled Schliemann to predict that if he were to dig in a certain hill in Asia Minor he would discover the ruins of Troy. Whereupon he took his spade and dug. Here, then, is an example of direct experiment in history, of a type of experimental method which has gained increasing prominence as history has become more scientific. The second main type of experiment in history is less direct, but substantially the same. On the basis of his hypothetical reconstruction of the past, the historian may turn from the whole body of criticized evidence which forms its support to the search for new authorities, to the investigation of

documents and elements of the tradition which have not been used in the formulation of the theory. What is important here is that the new facts should be independent of those grounds of fact upon which the theory is supported. The scientific historian has to spend much time in estimating the independence of his witnesses. But given this independence, then we have a true experiment, however indirect it may be. For we may now compare what has been actually discovered by the search with what was or should have been expected as logically implied in the theory. The appeal is beyond the belief-system, and is governed and guided by the belief-system, and this "verification" has all the characteristics we noted in dealing with physical science. It involves deliberate activity, it does not constitute proof, it is most effective when the results are negative. For the aim of the scientific historian is not to prove his hypothesis true, but to produce a deliberate development of the hypothesis through imaginative reconstruction, in which continuity is maintained.

These two types of historical experiment are limited in their application. There is, however, a third type which, though more difficult, is yet more important and more effective. History is continuous. The implications of its belief-systems stretch from the past into the present. As the theoretical or imaginative development of the implications of a historical hypothesis proceeds, it becomes more possible to realize its bearings upon the social life of the present. Thus it has been said, with paradoxical exaggeration which drives home an important truth, that all history is contemporary history. The present is the creation of the past, and therefore a theory of the past implies, in its development, a theory of the present. At this point experimental observation is possible which is of a quite direct kind, in which the expectation based upon the theory of the past can be tested by a direct and purposive observation of present phenomena.

By the use of these methods of experiment history has become scientific. It remains, of course, very largely æsthetic, an art rather than a science. That I have no wish to deny. The æsthetic, imaginative construction which plays so large a part in it is, however, just as essential to physical science. Indeed, what I have distinguished as the logical or theoretical side of scientific activity is truly æsthetic in a broad sense. The immediate perception of implication, or of systematic coherence, is an essential element in all science. But in itself it is insufficient. It must be supplemented by experiment before scientific knowledge begins. So far, then, as history relies on a subjective intuition of coherence as its guarantee of truth, so far it is not science, but art. [So far as it treats this systematic coherence as a ground for experiment, and apart from the experimental activity treats it as hypothesis only, so far it is completely scientific; for it has adopted the scientific concept of the nature of knowledge.

With regard to the second question, whether this scientific view of knowledge can apply outside what is usually regarded as science, I wish only to make a few tentative suggestions. If we propose to maintain that there is only one type of knowledge and that this is represented by science, then much of our philosophy must be reconsidered. Most of it is, in the sense defined, purely æsthetic. The most fundamental article of scientific faith is that no belief can ever be its own justification, and that for this reason the coherence of a system of belief can never be accepted as a proof of its truth. The antithesis of knowledge is not ignorance but belief. To launch out upon the adventure of knowledge is to challenge belief to justify itself. It is to refuse to accept conviction, however intense and organized, as a good argument. It is to accept scepticism as the price of freedom. Knowledge must be deliberate, and it can only be deliberate by setting itself over against the psychological growth of belief,

which is a natural phenomenon of the mind, and finding the means to accept, reject or modify it upon objective grounds. The moral struggle is as real and as essential in this domain as in any other.

But though it must be admitted that much of our philosophy is æsthetic, and that its general temper is antipathetic to the scientific view of the nature of knowledge, it does not follow that the victory of the scientific concept would mean the disappearance or even the subordination of philosophy. Philosophy itself might become scientific. It has only to recognize the hypothetical character of its axioms and postulates, to treat the tradition of the past as the basis of a common search for truth, and to discover the possibility of an experimental procedure. Like science, philosophy would have to exchange conviction for development, cease to entertain the vain hope of certainty, and supplement its natural scepticism of fact with an equally solid scepticism of theory and speculation. If we look with open eyes upon the philosophers of the past and of the present, is it not clear that their convictions were but hypotheses after all, which scientific development, more than any other factor, has forced us to abandon? Is it not equally true that if we study closely the history of philosophy, we can trace, overlaid by masses of irrelevant and imaginative speculation, a tiny stream of continuous development, hardly deliberate, but nevertheless the vital essence of it? May we not hope that if we were to give up our claims and counter-claims, and concentrate instead upon securing, of set purpose, a continuous development of philosophical theory, the world would at last see the dream of ages fulfilled, and a philosophy might begin to unfold which should not be the private property of this individual genius or that sect or school, but a common body of deliberate and rational cognition, proving itself by the vitality of its growth and by its practical efficiency.

Could philosophy become experimental? It seems to me not impossible. It has created in the past, half-unconsciously, the instruments of scientific thought. The sciences themselves are its offspring, often enough its undesired offspring. They are themselves philosophical experiments, and a closer and more sympathetically critical connection between the parallel developments of science and philosophy could make use of this fact. The failure of psychology is the failure, in a particular field, of a system of philosophical categories, the failure of a logical theory. Might not an understanding of that failure be used deliberately to determine a development of logic? From another angle we may see that all philosophy has practical implications. A theory of metaphysics implies a theory of social activity. The facts of human history are therefore the most eloquent of all criticisms upon philosophical systems. Here surely, if we wish it, there is room for a deliberate appeal from the speculative hypothesis to the facts of experience. Philosophy is grounded in fact. May we not hope that some day it may take its stand consciously upon fact, and organize its own development through a methodical and experimental criticism?



*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on March 21st, 1927, at 8 P.M.*

X.—SYMPOSIUM: ERROR.

By GERALD CATOR, C. E. M. JOAD, *and* H. J. PATON.

I.

By GERALD CATOR.

Il n'y saurait être question que du profit *intellectuel*, et par là J'écarte le Pragmatisme. (Paulhan, *Logique de la contradiction*, p. 126.)
Everything is real, so long as we do not take it for what it is not. (Bosanquet, *Logic*, Vol. I, p. 273.)

THERE is a certain penny which has the same sort of prescriptive right to be used as the example when we, in this Society, discuss questions of appearance and reality, as velvet and champagne had to typify luxuries in the writings of the political economists. I am, I trust, too loyal an Aristotelian to break with this tradition.

Let us try, therefore, to discover the real penny.

Imagine the penny to be fixed at the centre of an imaginary sphere of infinite radius. Place yourself first on the radius perpendicular to the plane of the penny, so as to look at it full face. While you are too close the penny will look a transparent blur with a rim, but as you withdraw you will soon reach a position of best visibility and will see what Colonel Bogey—I propose that we adopt him as the concrete representative of the overworked “plain” or “average” man calls the real penny, the penny as it really is. From this position outwards the penny as a visible object is, disregarding consequent changes in the visibility and definition of the markings, a simple function of the distance.

Colonel Bogey's penny, the penny as seen under normal conditions by normal eyes from some one privileged position on

this radius, is displaced from its position as *the* real penny by what I will call the penny as a concrete universal of the first order—the penny as seen from *any* position along *this* radius.

Other universals of the first order may be obtained to express the penny along all other radii.

The combination of all these first universals into a formula, which will express the penny from any distance and in any direction, will be a universal of the second order.

Here we pause to notice an important result, namely, that here, disregarding, of course, any other aspects than shape and colour, we have exhausted the possibilities—we know the penny from all possible positions—and this is an important step towards the real penny.

Suppose now that the same process is continued till, in a universal of the highest possible order, we have expressed the penny under all possible conditions and in all possible relations with all possible objects. Here at last, here and not in the penny as seen from a privileged position, nor in something lurking inaccessible behind a screen of appearances, we shall have the real penny set in its place in the real universe.

In this last universal, which not only as a matter of fact, but, since it would exhaust possibility, also as a matter of theory, would be that than which no greater can be conceived, every aspect of reality, from the most momentous down to the most trifling and evanescent, would have its proper place and *in that place* would be essential to the whole.

Common-sense objects (pots and pans, acorns, lumps of sugar, and the like), fictitious objects (the characters and events in *Ivanhoe*), objects of superstition, anthropomorphism or animism; objects of delirium or mania, scientific objects (atoms and electrons), religious objects (souls, angels). Each of these sorts of objects has its rights, and each of them has its duties; the Creator as Creator, the creature as creature, the necessary as

necessary, the contingent as contingent, the important as important, the trifling as trifling.

Now, it would seem at first look as if (a) a mind of infinite capacity would be able to utter no definite judgments. For instance, such a mind could not pronounce anything about the real shape of the penny or the real colour of a piece of cloth. All its judgments would be in the form that the penny (or the cloth) is such as to appear as of such and such a shape/colour under such and such conditions. This is a mistake. As regards the penny in the universal of the second order, the whole set of its appearances would be different from the corresponding set of, say, a cube. An intelligence, therefore, thinking in universals of the second order would be able to make categorical judgments about a penny

NOTE.—Höfding, *Der Menschliche Gedanke*, p. 114, writes :—"We cannot lay down any rule as to how comprehensive a totality of experience a particular experience must be incorporated in, in order to be entitled to be adjudged real.

"The world of experience expands continuously and cannot be kept within prescribed limits.

"The concept of actuality or of existence is, therefore, paradoxical as it may sound, the concept of an ideal. To be in a position to make, in respect of any particular experience, an absolutely secure predication of actuality, we should have to be in a position to co-ordinate this experience with all other possible experiences, and this, of course, is not possible."

I hold, on the contrary, that in certain respects it is possible.

(1) The hierarchy of more and more comprehensive and exacting constructions of reality does not go on to infinity. It culminates in "*Id quo majus cogitari nequit*."

(2) In respect of some of its characters, those which are plausibly represented by the indemonstrable first principles of Thomist scholasticism, bright shoots of everlastingness, our experience is infinite and irreformable from the first.

(3) The Theistic construction of reality is not only a possible construction, it is the only possible construction, because it is the only one in which everything is able to be what it is and to avoid being what it is not. May I refer to an old paper of mine for an elaboration of these positions, "*Id quo majus*," etc. (*The Monist*, October, 1908).

as distinguished from a cube. And the same would hold of every higher order of universals. (b) We should be able to take no side in any dispute, but should always have to say something fatuous, such as "there are faults on both sides," "the accused is innocent from one point of view and guilty from another." Or, again, there would seem to be no reason for preference between two travellers disputing whether the object on the roadside ahead of them is really a robber or a bush.

My theory of error is designed to avoid this inconvenient consequence while retaining the comprehensivist theory of realness. The suppositions with which I operate are :

(1) That there is an absolute intellectual good which consists in the ideal possession of the whole system of reality. Subordinate intellectual goods are stages on the way to this supreme good. Propositions are true so far as they promote, false so far as they hinder the mind's movement towards the good, abstracting from collateral moral, spiritual, emotional, or practical effects.

(2) That though any significant assertion is of its own nature capable of being made the starting-point of a dialectical process culminating in the possession of this supreme good, yet not all starting-points are equally favourable.

Let me illustrate this in two ways, each of which has some advantages.

Even though "all roads lead to Rome," it does not follow that all roads are equally practicable. If the journey to Rome by some one road would need for its completion the expenditure of more physical energy than a traveller had at command, then he would never get to Rome by that road. It is the same

NOTE. —By using the Leibnitzian infinite analysis of contingent truths I can provide for roads by which no traveller, however endowed, would ever get to Rome, though he would always be approaching it.

with the *Itinerarium mentis ad Deum*, but here, of course, it is insufficient command of psychical energy that is in question.

The propositions which mark the entrances into impracticable roads are errors.

A perfect map of England would show every detail, but such a map would be as big as the country itself. If some smaller scale is imposed by circumstances, then some details must be sacrificed, and the only question is which. Similarly, with the intellectual representation of reality. The scope of our minds does not admit of full-scale representation of it. If we sacrifice the more central and important features for the benefit of the less important, we fall into error because we retard ourselves.

Two men disputing as to whether a shield is black or white are each of them partly right and partly wrong. Each of them is right about the colour of one side of the shield and wrong about the other side, and as neither side is more important than the other, neither disputant has, on balance, any advantage over the other.

The two travellers disputing about "bush" or "robber" are also each of them partly right and partly wrong, but in this case the honours are not equally divided. The correct formula would be "such as to present the appearance of a bush under such and such conditions of illumination and of nerves, and the appearance of a robber under such and such other conditions of illuminations and nerves."

If the object is taken as a bush, a relatively short and easy way is opened to incorporate it into that common-sense construction

NOTE.—We may choose as we like to say "*is* under certain conditions" or "*presents the appearance of* under certain conditions" so long as having chosen our location, we stick to it consistently. What we must not do is to fall into Bogeyism and to say that the object *is* what it *appears as* under, what we choose to regard as normal conditions and only *appears to* be what it *is* under abnormal conditions.

of reality, which in its turn leads easily and naturally on to the Theistic construction of reality. If, on the other hand, the object is taken as a robber, it has to be regarded as a robber of a very peculiar kind—one, namely, which has the property of turning into a bush by day or when closely approached. If we enter on this way the complications soon become *practically* insupportable.

I will not attempt anything like an enumeration of the causes why some starting positions are more favourable than others, some of them may depend on the original constitution of the human mind, others on acquired habits of thought.

One chief reason is what I call the confusion of personalities. The common-sense construction of reality, the world of qualified (primarily material) things related externally in time and space, is developed almost without effort by the spontaneous intelligence in the service of the active life. There it is and there it remains. As a consequence of this preoccupation it pays the philosopher, pays him *intellectually*, to keep on friendly terms with the plain man within him, and not to admit complications and elaborations into his scheme till his *alter ego* is ready to receive them without being scandalized.

The speculative army of occupation in each of our minds cannot hope to extirpate the aboriginal plain man. Instead, therefore, of wasting our none too ample resources on a necessarily fruitless policy of repression, let us change our tactics and go in wholeheartedly for conciliation. Let me revert to the roads to Rome illustration.

NOTE.—Meyerson, in his important work, "*Identité et Réalité*," p. 339, says: "Directly we press our enquiries a little the world of common sense shows itself as what it is in fact, a first and very crude sketch of a scientific and metaphysical system."

NOTE.—"*Unus homo sustinet plures personas*," the mind of a man is a committee of mindlets. Colonel Bogey and the speculative philosopher are two of these personalities.

If the philosopher chooses one way he will have to exhaust himself in dragging his inseparable companion, kicking and struggling, with him. If he chooses another way, one which will lead him to the same goal, the plain man will readily agree to accompany him "as far as to the horizon"; and as they journey amicably side by side the horizon will recede and recede. It is a simple question of tactics.

Our problem is essentially a housewife's problem. We have to lay out our endowment of psychical energy as economically as possible. If we do we shall appropriately gain a good housewife's reward. We shall live intellectually in a world where there is a place for everything and where everything is in its place.

NOTE ON THE CASE OF GALILEO. — So far as I know, the seed of the theory I have just expounded was sown in my mind by a remark of Newman's made, I think, in connection with the case of Galileo. I quote from memory. "Truth is error to those who are unprepared for it, because of the refraction with which it enters their minds."

If the theologians who condemned Galileo did so because in their minds the two propositions: (1) The Earth is theologically the centre of the universe; (2) the Earth is astronomically not the centre of the universe—were impossible, they acted rightly in point of logical principle (see Bradley, "Principle of Logic," second edition, Terminal Essay, III).

These theologians were intellectually in the same position as is morally a man with a false conscience; he did one wrong to come by it, he would do another if he disregarded it while it persists. For the same reason, the rustic who is reported to have looked solemnly at the giraffe and to have said, "I don't believe it," did right. The argument from *esse* to *posse* can be met by the counter argument from non-*posse* to non-*esse*.

II.

By C. E. M. JOAD.

(I.)

I confess that I find difficulty in understanding Mr. Cator's paper, mainly because I do not know what he means by his terms. Terms like "absolute intellectual good" and "ideal possession of the whole system of reality" are to me practically meaningless, or, rather, they are capable of bearing so many different meanings that, until I know which of these meanings Mr. Cator wishes us to attach to them, I am afraid I shall run the risk of seriously misunderstanding him.

All that I can do, therefore, is to proceed upon the basis of what I think he is, on the whole, mostly likely to mean, and to criticize him from that standpoint, bearing in mind the fact that it may be an illegitimate standpoint.

I assume, then, that by his proposition (1) on page 216 he wishes to assert that *truth* is an absolute intellectual good, which consists in the ideal possession of the whole system of reality, and I assume this because if it is not *truth* that he is here writing about, I am at a loss to know what this absolute intellectual good is, or why it should be mentioned.

This assertion seems to me to be open to the following objections: (a) Nobody that we know is in ideal possession of the whole system of reality; it follows, therefore, that nobody knows what this intellectual good which is identified with truth is. If it is unknown to us, we cannot know what it is like or what it is not like. Since then we are ignorant of its position and nature, we cannot tell when we are moving towards it and when away from it. Now, a true proposition is, according to

Mr. Cator, one that promotes the mind's movement towards this intellectual good. If, then, we do not know whether on any given occasion this movement is or is not taking place, we do not know and cannot know of any proposition whether it is true. In other words, we have no criterion of truth.

Now, it is quite clear that there is some sense in which it is true to say that the whole is larger than the part, or that Cæsar crossed the Rubicon; there is also a further sense in which *we know* that it is true to say these things. In abolishing the criterion of truth, therefore, Mr. Cator makes no provision for the fact that we know that some propositions are true in a sense in which their contraries are false.

(b) If the nature of truth is unknown to us, we cannot know that any of Mr. Cator's propositions are true. In his proposition (2) he suggests that some propositions are truer than others (I presume this is what he means by saying that some starting-points for dialectical process are more favourable than others), and implies, therefore, a belief in degrees of truth. That one proposition is truer than another may, of course, be the case, but, if it is we can never, on Mr. Cator's premises, know that it is. You can only measure the comparative distances of two points on a road from a goal if you know what and where the goal is. If Mr. Cator does not know what his absolute intellectual good is, then he cannot know with regard to any one starting-point that it is nearer to it or more favourable as a point of approach to it than another. Thus any candidate for the rôle of being a favourable starting-point could always be disqualified by the assertion that the ideal possession of reality was something quite different from what Mr. Cator supposes, and, since Mr. Cator cannot tell us what this ideal possession is like, he would have no success in maintaining his selected favourable starting-point against a person who insisted on a contrary proposition as *his* starting-point.

In this connection it should be noted that the analogy in which Mr. Cator makes use of the statement "all roads lead to Rome" is not applicable to the case in point. He truly points out that although all roads do lead to Rome, some are shorter and easier than others. But we only know them to be so because, having already been to Rome, we can compare the merits of the various ways of getting there. If we had not been to Rome and did not know where or what Rome was, we should not know either that some starting-points were more favourable than others, or, if some were in fact more favourable, which the more favourable were.

It follows that even if there is some meaning in saying one proposition is truer than another, we cannot in our ignorance of the truth know what that meaning is or which is in fact the truer.

(c) I showed in (b) that, if Mr. Cator's propositions are true, we cannot know that they are. But we can go further and assert that they are not true. Statements about the nature of truth are not the "ideal possession of the whole system of reality." Therefore, since this and nothing short of it is what truth is, they are not true. Nothing, indeed, which is not this ideal possession of the whole is, if Mr. Cator is right, wholly true. Therefore Mr. Cator is not wholly right, but partly wrong. Therefore it is partly false that truth is "the ideal possession of the whole system of reality."

The above difficulties spring, in my view, from certain fundamental errors in Mr. Cator's position. Of these the following are the most important: (a) In identifying truth with an absolute good he makes it unknown and, for all practical purposes and finite beings, unknowable. In so doing he (1) overlooks the fact that quite humble truths, such as that $2 + 2 = 4$, are not only true, but are known to be true, and (2) implicitly denies the possibility of any human knowledge being true. If no human knowledge is true, the distinction between truth and error is obscured,

and, since the doctrine of degrees of truth cannot, as I have shown, be, on Mr. Cator's premises, sustained, it seems to follow that everything is both true and false.

(b) Mr. Cator appears to hold that a test of truth is to be found in the fact that what tends to be or is on the way to being true gives mental or moral satisfaction.

I infer this (i) from the discussion about the robber and the bush from which it emerges, that the object is to be regarded as more really a bush because as such we can "incorporate it into that common-sense construction of reality, which in its turn leads easily and naturally on to the Theistic construction of reality."

(ii) From his description of truth as an intellectual *good*.

(iii) From the reference to Pragmatism at the head of the paper.

The difficulties to which the Pragmatic theory of truth is exposed are too well known to be recapitulated here. In the sense in which Mr. Cator seems to hold it, it ignores the fact that many propositions give neither mental nor moral satisfaction, yet are indubitably true in a sense in which their pleasing contraries are false. Such propositions are, "I have just missed my train," "I have lost all my money," "I am about to visit the dentist."

(c) He makes truth subjective by establishing its dependence upon the constitution of the human mind. This follows from his identification of greater truth with more favourable starting-points for dialectical processes, more favourable, that is, to the human mind, and his assertion that what determines a favourable starting-point may be a habit of thought.

If, then, my habits of thought are different from Mr. Cator's, different starting-points will appear to each of us to be the most favourable, and what is true for me will be untrue for him. For monkeys, who may be assumed to possess a "different original" constitution of the mind, propositions will be true which for men

are false. Thus, on Mr. Cator's view, it might be true that from some points of view, *e.g.*, from the monkey's, $2 + 2 = 5$.

Considerations of this kind are obviously applicable to what *we think* true; but we fall into grave error if we suppose them to have any bearing on the question, what *is* true. That there is a distinction between what we think true and what is true is obvious (if there were not, there would be no such thing as error); that what we think true depends in part, perhaps wholly, upon our temperaments, our wishes and the constitutions of our minds is equally obvious. But, if the distinction is to be maintained, it is clear that what I think true cannot possibly have any bearing upon what is true. I may think propositions true because they are; they are not true because I think them so.

I wish, therefore, to emphasize the point that what is true, as opposed to what is thought true, is not dependent for being so upon the constitution, disposition, interests, proclivities of any mind or minds whatever, but upon something external and other than the mind which asserts the proposition which is claiming to be true.

(II.)

I can most conveniently expand this statement by starting with what Mr. Cator says about the penny. I think there is some confusion in his account of what we see when we look at a penny, which arises from his belief that there is such a thing as a real penny "set in its place in the real universe," such that other pennies which are seen from less comprehensive points of view are somehow not real, or are less real than the real penny. (Personally, I do not know what is meant by the suggestion that one thing can be more real than another. If a thing, whether penny or universe, exists, it is real, and nothing that exists can be either more or less real than it.)

In opposition to this view I should maintain that there is no such thing as a real penny, either in the common sense or in the

absolutist sense ; what there is is a system of distinct but similar sense data to which we give the name of penny.

In questions of perception I start from the assumption, which I cannot here defend, that what you see is not the same as your seeing ; nor, indeed, does your seeing, taken as a mental act, contribute to or affect what you see. (The medium constituted by the *physiological* apparatus by means of which you see—that is, your eyes, your visual chords and the nerve centres in the brain—does contribute to and affect what you see ; but this point does not concern our present issue.) Now, it is true that, from whatever point of view you look at the penny, you see something different : it follows, therefore, that there is a something different to be seen from that point. This something is in each case a brown patch of a certain size and shape, and a different patch is seen from each point of observation. The system of the brown patches which are seen from all possible points of observation is the penny ; but that does not mean that there is a unified source or archetypal penny, as it were, behind the brown patches, of which each brown patch is a different aspect.

The patches are not the common-sense penny for the reason that, if I look at a penny a yard away and a halfpenny an inch away, the brown patch which I see and which I call the halfpenny will be larger than the brown patch which I see and which I call the penny. Yet the common-sense penny is larger than the common-sense halfpenny. The reason for denying the existence of the common-sense penny as a persistent entity behind the brown patches is that you never in experience meet with it. When you try to do so all that you in fact come across is more brown patches of different sizes and shapes.

I have given this analysis of the occurrence which is known as seeing a penny because there follows from it a certain view of perception upon which the theory of truth which I wish to advocate depends. The view of perception is as follows :—The

relation of the object which we perceive (the object always being analysable into a set of sense data) to the mind is one of direct presentation. The mind is aware, that is to say, of a directly presented sense datum. The relationship between the mind and that of which it is aware is always the same; it is the same whether the object is perceived or is thought about, the difference between perceiving and thinking being not a difference between mental activities, but a difference between the objects of which the mind is aware. Objects of which we are aware in thinking are variously known as subsistent objects, objects of thought, or concepts; they are never the same as the objects we perceive (this follows from the fact that what I perceive when I see a penny is a brown sense datum, but what I think about is nothing of the kind), but they are no more mental than the objects of perception. The assertion of the non-mental character of objects of thought follows from the assumption made above, that that which you perceive is never the same as your perceiving; if this assumption is valid as regards objects of sense, it is equally valid, and valid for the same reasons as regards objects of thought.

It seems to me essential for any satisfactory theory of truth and error to emphasize these two points. first, that the relationship of the mind to its object is always the same, and, secondly. that this relationship is one of direct awareness. The mind, in other words, contributes nothing to that of which it is aware; it does not construct it, distort it, manipulate it, or add to it. We perceive and think about everything just as it is, and there is no difference, therefore, between the object as known and the object before it is known. Failure to adhere closely to this position leads us into hopeless difficulties. If, for example, we were to admit with regard to any object we know that the mind may have contributed something to its nature, then we cannot stop short of the admission that the mind may have manufactured the whole of it. It is impossible to draw the line between those

parts of what we see or know which we ourselves have constructed or modified in the process of seeing or knowing, and those parts which we know as they are; hence we can never know of any part or aspect of the object that this part or aspect is *not* the result of mental projection or construction. Since, then (if we make this admission), any part of the reality which we think we truly apprehend may, for all we know to the contrary, be not the external world at all, but merely a product of our own thinking, it follows that we can never know reality as it is, or, to be exact, that we can never know that we do. This view leads to the difficulties (1) that if we can never truly know reality, we can never know that any proposition we make about it is true; (2) that, since all our judgments may on this view be false, in the sense that, although purporting to be about something other than ourselves, they nevertheless fail to relate to anything outside ourselves, the distinction between truth and falsehood, so far as we are concerned, goes by the board.

If, then, we refuse to make the admission in question and steadfastly adhere to the view that the mind contributes nothing to what it knows, two conclusions emerge: -

(i) Since the relation between mind and its object is always the same, the distinction between truth and falsehood cannot be a property of that relation. When we make a false judgment we know the object about which the judgment is made in precisely the same way as we know the object of a true judgment.

(ii) The objects which we know in dreams and hallucinations are just as real, are known in precisely the same way as, and are no more mental than the objects of our normal waking thoughts and perceptions.

We are now in a position to state our theory of truth and error. (1) Truth is a property of judgment or propositions. The presence or absence of belief in the judgment made or proposition asserted has no bearing upon the question of its truth or falsehood.

For thousands of years everybody believed in the truth of the proposition "the earth is flat," but the existence of this belief did not make the proposition true. The truth and falsity of propositions and judgments is, therefore, independent of belief; it is also independent of any mental attitude on the part of any mind or body of minds. (2) The content of a proposition is determined in part by its opposite, the proposition "snow is white" being determined by the contrary proposition "snow is not white." If, therefore, the true proposition "snow is white" is objective and states a fact, the false proposition "snow is not white" must be equally objective and must also state a fact. (3) Since everything that we experience, including even the objects of hallucination, exists, and since false propositions have objective validity and state facts, what meaning are we to assign to error?

Truth and falsehood, we say, are characteristics of judgments or propositions. Now, in judgment I do not assert anything about my own mental states (if I were to admit that I did, the difficulty mentioned above would apply, and I should never know that I judged about anything other than my own mental states); nor do I assert a correspondence between an idea of mine and reality (there are no such things as ideas, and unless we know reality the correspondence could not be made out. This is the difficulty of the old copying theory of truth). Therefore a judgment is always about one or more objects of thought, and it asserts that objects of thought stand or do not stand in certain relations to each other.

(4) Objects of thought may or may not have physical counterparts (we can put this, if we like, by saying they may or may not stand in a certain relationship to the concept of existence), but the physical counterparts, which are sense data, are never the same as the objects of thought.

(5) A true judgment is one that asserts a relationship between objects of thought such that their physical counterparts stand to each other in the same relationship, as, for example, in the case

of the judgment, Cæsar crossed the Rubicon. This judgment asserts a specific connection between the conceptual objects Cæsar and the Rubicon, and as the connection in question held between the physical counterparts of the conceptual objects in question, the judgment is true. The judgment, Alexander crossed the Rubicon, is false, because no relationship of the kind asserted ever held between the physical counterparts of the conceptual objects in question. Where the judgment makes an assertion about the qualities of a subsistent object, it will be true if the physical counterpart of the object of thought which forms the content of the proposition asserted, does possess the qualities which the object of thought is stated to possess. Thus the proposition, the grass is green, is true, because the object of thought which is the content of the proposition, namely, green grass, possesses a physical counterpart. The proposition, the earth is flat, is false, because there is no physical counterpart to the object of thought, flat earth.

(6) In conclusion, I would like to emphasize three points. First, in order to maintain that the function of the mind in belief is limited to that of direct awareness, it is necessary to hold that the proposition in which belief is asserted, whether true or false, always asserts a fact; it is of this fact that the mind is aware. Since, therefore, all propositions assert facts, the contents of false propositions are constituents of reality. Secondly, the facts which true beliefs assert are not physical facts, but are facts about objects of thought; nevertheless, that which *makes the belief true* is a fact not about the object of thought, but about its physical counterpart. Thirdly, the objects with regard to which a particular judgment or proposition actually asserts a relationship, being objects of thought are other than the objects about which we purport to make an assertion when we wish to assert something about objects of sense, that is, about the physical counterparts of the objects of thought.

III.

By H. J. PATON.

(I.)

It is easy to fall into error, but curiously difficult to know what error is. We can find examples of error on every side, and most of us will admit that we have fallen, and do fall, into error ourselves; yet, in spite of this superabundance of examples, and in spite of this intimate personal experience, we must allow that we are only too likely to fall into error as to what the nature of error is. It is a poor consolation to know that if we do so, we shall at least provide an example, although we cannot offer an explanation, of that reality or unreality which it is our business to describe.

The discussion of this subject by Mr. Cator and Mr. Joad serves to bring out one truth (or truism) -- that our theory of error must depend upon our theory of truth. Indeed, in their accounts, the theory of truth bulks much more largely than the theory of error, yet even so I have difficulty in understanding their different theories of truth, and, consequently, an even greater difficulty in understanding their different theories of error. I attribute this difficulty to the fact that their theories are in each case part of a wider philosophy whose nature I have in the main to surmise. If I fall into error about their different points of view, I shall attribute that error neither to my own incapacity for following, nor to theirs for setting forth, a philosophical argument -- although it is possible that such considerations may enter in -- but rather to the fact that we all understand any theory as part of a wider whole. Where we do not have the whole in its completeness, we must in some way go beyond our

evidence, and so may, and perhaps must, fall into error both about the part and about the whole. None the less, it would be impossible to do so, unless we had apprehended in some degree both the part and the whole of which it is a part, or, in other words, unless we had attained to some limited kind of truth.

This appears to me to be not merely the simplest explanation of my own errors in this connexion, but also the main principle which lies at the root of all human error. As finite beings, we are dealing with parts which we know to be parts of a whole, but since we cannot attain to the whole in its completeness, we are liable to fall into error in regard to the parts. None the less, we could not fall into such error, unless we had some truth both about the parts and about the whole ; and where we have a part which is itself a rich and highly articulated, if still partial, whole (as in mathematics or empirical science or history or philosophy), we have reason to believe that we have a greater hold upon truth. The progress of truth among men is made as our thinking becomes more systematic, and as we grasp more thoroughly the coherent articulation of the universe as a whole of parts.

It will be seen from this that I am in agreement with Mr. Cator as against Mr. Joad in what appears to me to be the main difference between them. Mr. Cator recognizes that the real is a systematic whole, and that truth belongs to propositions in so far as they contribute to a systematic understanding of the universe ; while Mr. Joad—or, so it seems to me—attempts to shiver truth and reality alike into a series or aggregate of isolated splinters. I propose, therefore, to say no more about Mr. Cator in the way of criticism, except this : firstly, that his account appears to me unnecessarily pragmatic ; and, secondly, that to me it is not quite clear whether he regards advance in truth as the adding of one external thing to another or whether he regards it as a living and organic growth. If he regards truth as a mere aggregate or sum of truths, then it appears to me that Mr. Joad's

criticisms are unanswerable. If he does not, then the supposition behind Mr. Joad's criticisms becomes invalid, and the criticism itself (except in so far as its presuppositions can be established, as the only possible basis of a true philosophy) appears to me to be a mere *ignoratio elenchi*.

(II.)

It is more difficult for me to deal with Mr. Joad. In his case I am faced with perhaps the greatest differences which can divide philosophers. Broadly speaking, nearly all his presuppositions appear to me to be false, while his conclusions are incomprehensible. I propose to deal first with the presuppositions or premises, and thereafter with the conclusions.

Perhaps it would be well to begin with the only fundamental doctrine in which he and I are in at least partial agreement. On page 226 he says: "If, for example, we were to admit with regard to any object we know that the mind may have contributed something to its nature" I presume that he means "its nature as known"—"then we cannot stop short of the admission that the mind may have manufactured the whole of it." This statement I believe to be true, although my interpretation of it would, I imagine, be somewhat different from that of Mr. Joad; and would certainly not mean that the object was manufactured by a momentary act of awareness, or even that it was manufactured by a mind as an isolated thing in itself with a beginning and ending in time. If we set aside, however, the admittedly difficult question of interpretation, I affirm with confidence that as a matter alike of experience and of theory my previous thinking does make a difference to every object that I know, and does, therefore, contribute something to its nature. My understanding of a poem or an argument manifestly depends on my previous experience and my previous thought, and—to take

merely one side of it—on my knowledge of the language in which it is expressed, a knowledge obviously acquired through a long acquaintance. And this means that to me the object is a different object because of my previous history. Mr. Joad seems to prefer to consider only objects of a humbler kind, but the same truth holds, although in a less conspicuous degree, of humbler objects such as horses and motor-cars, and even, as we shall see in a moment, of what he calls sense-data. The mind obviously contributes something to the nature of the object as known, and therefore, according to Mr. Joad, may have manufactured the whole of it.

Mr. Joad, however, shrinks from the conclusion, and therefore denies the (to me) manifestly true supposition on which the conclusion follows. His only arguments are directed against the conclusion, and depend upon the further presupposition that reality must be something wholly external to, and other than, mind. It seems to me perfectly clear that his attempts to prove this are made possible only by the presupposition that it is already proved and, indeed, that anything else is unthinkable. I would suggest to him that there is at least the possibility of another way out, a way which certainly deserves a little further exploration. So far from his problem being the refutation of idealism, it is precisely this problem which leads to the development of idealism in its modern forms.

I would add just one word on the subject of sense-data. I am aware that on this subject he is perhaps more likely to find support than I, but I should like to press upon him the question whether these sense-data are given direct to the mind as the basis and starting-point of further knowledge, or whether they are given as the result of analysis by mind itself. If they are the first, I should say that such things could not possibly be given and never are given; if they are the second, they are fictions which may have a greater or a less utility in psychological investigations. I

am concerned with them only in the first sense, and I deny that in that sense they can be an object of mind apart from the activity of the mind which knows them. Certainly, the brown patches which are the object of my present seeing are what they are as instances of a universal, as having a definite position in space and time, as organic parts of an ordered world. They are, in short, much more than sense-data and cannot be given to sense at all. Except as distinguished from other things they are to me nothing, and this distinction is possible only to a mind whose activity goes beyond the moment. I believe that Plato in the *Theaetetus* disposed of these unrealities, and that although the same error is constantly recurring, his arguments—not to mention those of Kant—have never been answered. We must all have observed the great difference that there is in the quality of a sound which we thought to be caused by something far away, and then discover to be caused by something near. And I am glad to have an opportunity of expressing my disagreement with the view so often stated that “if I look at a penny a yard away and a halfpenny an inch away, the brown patch which I see and which I call the halfpenny will be larger than the brown patch which I see and which I call the penny.” Such a statement is true, only if I regard both as existing in the same plane parallel to the plane of the eyes. When we estimate the relative sizes of things we do so only by reference to some situation in space.

This, however, is merely a side-issue, and my heresy no doubt may require qualifications. What I must insist upon is that the mind always and necessarily contributes something to the character of the object as known. Mr. Joad may be right in saying that this implies at least the possibility that the world as known may be created—or, if he prefers it, manufactured—by mind. His difficulty about this is simply an unargued prejudice that reality cannot be mind-created, and consequently that in knowing the mind-created we are knowing something other than

the real. The plausibility of such a contention depends on my view upon a false theory of mind.

I do not know how far Mr. Joad would accept my account of his theory of mind, but it appears to me that he regards the knowing or thinking mind merely as an object or series of objects. He thinks of mind as an object which is contemplated, rather than as an activity which is enjoyed. Mind is to him something about which he thinks, and not the thinking about thought which he himself practises and enjoys. I believe, from something I read of his elsewhere, that he modifies this position, at least in regard to art, but I can see no sign of any other position here, and his remaining doctrines all seem to me to follow from some such view of the mind. At any rate, starting from a supposition of this kind, I can go with him a certain distance along what I believe to be the path of error.

The mind, as an object, becomes at once inert and inactive. It contributes nothing to what it knows. Its relation to its object is always the same. That relation is one of direct awareness, and the mind is, I presume, a series or succession of direct awarenesses. Objects of various kinds, all existing in complete independence—sense-data, objects of thought, true and false propositions, objects of dreams and hallucinations—impinge upon it or come before it at different times. In all this it does nothing whatever. The difference between sensing and thinking, the difference between denying and asserting—and even, I suppose, the difference between questioning and supposing and thinking and knowing—all these lie on the side of the object. The mind, in short, becomes a mere blank, all its differences are transferred to its objects, and all that remains to it is direct awareness or, perhaps, a series of direct awarenesses which in themselves are all exactly alike. This direct awareness is perhaps not improperly described as a relation, or, as Mr. Joad calls it, “a relationship.” I do not know whether he meant to imply

some difference between "a relation" and "a relationship, but in any case I should like to know what it is that is related.

Such a view appears to me a perfectly coherent development of the initial supposition. I would merely ask why we should stop at this point. I can see no reason for retaining the mind on this view at all. It would be much simpler to regard minds as mere bundles of objects. The next step would be to deny all connexion between the different objects. I do not know whether Mr. Joad takes this step or not—he denies the "unified penny," although he speaks of it as "a system of distinct but similar sense-data"—but, in any case, it appears to me the logical conclusion. To regard mind as merely an object like other objects is, in the end, to deny mind altogether and to abolish unity from the world. Without the activity of mind the world becomes a series of distinct existences between which there is no connexion. Mr. David Hume and Mr. Bertrand Russell have already shown us the way, and I can see no ground for stopping short of their conclusions.

(III.)

I now turn to questions more nearly concerned with truth and error.

One of Mr. Joad's strongest objections to the doctrine of Mr. Cator is that it abolishes the criterion of truth. Yet, so far as I can see, Mr. Joad's own theory has precisely the same effect. If our state of mind is exactly the same, whether we attain truth or falsehood, it surely follows that we can never know whether our judgments are true or false. In each case we have direct awareness, and in each case we have a real object. The fact that at other times we have direct awareness of another real object does not seem to me to help, but I shall return to this later. For myself, I can only say that if the mind is reduced

to a series of immediate or direct apprehensions, there is no distinction whatsoever between truth and error.

Mr. Joad is very anxious to maintain that we know certain humble truths to be true, such as that $2 + 2 = 4$, and that Cæsar crossed the Rubicon. This view has obvious attractions, but I do not think that Mr. Joad's theory justifies such knowledge, nor do I think that those who hold other theories "overlook" such facts—so far as they are facts. My confidence in such truths depends not on immediate awareness, but on the fact that these judgments are bound up with a whole system of judgments, and that the whole system stands or falls with them. Roman history is all nonsense if Cæsar did not cross the Rubicon, and arithmetic is all nonsense if $2 + 2$ are not equal to 4. Yet I must add that we must be prepared to modify even some of the truths which seem to us most certain and most immediately apprehended. If I understand it aright, the work of Einstein compels us to modify theories which formerly seemed to be most certainly true, but this does not mean that these previous theories were errors and nothing else.

The kernel of Mr. Joad's position appears, however, to lie in the contention "that what I think is true cannot possibly have any bearing upon what is true." Such a contention seems to me sound so far as it asserts that thought, considered as an immediate fact or a direct momentary awareness, does not guarantee the truth of what is thought. An idealism which rests on pure immediacy (like that of Bishop Berkeley at his weakest) is erroneous, and can with difficulty be distinguished from some forms of realism. It does not, however, follow that thinking plays no part in truth or error at all. On the contrary, it is thinking which makes either truth or error possible. Without thinking there is no truth, and without thinking there is no error. No statement of any kind is an error unless somebody believes it to be true. It is one thing to say that truth (or what is true)

does not depend only on an immediate awareness. It is quite another thing to say that mind is not essential to the existence of truth or to any thing's being true. Mr. Joad seems to me to confuse these very different statements or to infer the one from the other. He might as well argue that because a rifle without a cartridge is harmless, it therefore plays no part whatever when a man is shot and killed.

Up to this point I seem to myself to have been able to follow, although not to accept, Mr. Joad's argument. Thereafter, perhaps because of the brevity of his exposition, I find myself in a strange region wherein I can maintain no sure foothold, although I can still recognize that some of the things he says are said also by other people. There is consequently a danger of my criticisms seeming merely verbal, but I can only say that they are meant as an attempt to clear up what are to me obscurities.

I gather first of all that the mind is directly aware of judgments or propositions (the terms seem to be interchangeable) which are objects among other objects. Yet they have the curious property of being "about" other objects, and these other objects (which I understand to be always the special kind of objects called objects of thought) are always equally, and apparently in the same sense, real. These other objects (called also "the content" of the propositions) are known to the mind, and their being known and being real are entirely independent, alike of anything that the mind does, and of the truth or falsity of the proposition which is about them. I take it that the proposition or judgment is not merely a collection of words or sounds, and it is said to "assert." I am not sure whether a proposition or judgment may be also called a belief; Mr. Joad speaks of "true beliefs" and at the same time describes truth as a property of judgments or propositions; on the other hand, he talks of "belief in" a judgment—is this different from "direct awareness"?—and says it has no bearing upon the question of truth or falsehood.

He also speaks of "the proposition in which belief is asserted." Does this mean that the proposition asserts belief (which would make belief essential to a proposition), or that something else asserts belief in the proposition? And, again, a proposition is said to be "asserted" as well as to "assert." These statements are all taken from Mr. Joad's final exposition of his theory of truth and error with which alone I am now concerned.

The subject is a difficult one, but the account given certainly does not help me to understand what is meant by a judgment or proposition which is not an activity but an object of mind. For myself I can understand a person or mind judging or asserting, and when I say that a judgment asserts I mean simply that a mind in a particular act of thinking asserts. What is asserted is "that S is P." "That S is P" is what is asserted not what asserts, and I am quite prepared to call it a proposition. But in itself it is nothing except a collection of words; it is a mere abstraction, and calls out for the "I think" to complete it and to give it life. Apart from the "I think," which is not an object thought about but a subject thinking, there is no truth or error at all.

Hence I do not understand in what sense Mr. Joad's propositions assert, since to me nothing can assert except a mind. Nor can I understand what it is that they assert. Mr. Joad complicates this by introducing what he calls "facts." Propositions assert facts, and these facts, like the propositions themselves, are "about objects of thought." Perhaps we may dismiss these facts as mere reduplications of the propositions. Propositions, then, are about objects of thought and assert that these objects stand or do not stand in certain relations to one another.

At this point we come to the most interesting and surprising part of Mr. Joad's theory. Thought is for ever doomed to remain within the circle of its own peculiar objects (whatever they may be) and can never penetrate to sense-data or physical reality—

these latter are to Mr. Joad the same. I think I am right in saying this about thought, and I am certainly right in saying so about propositions. We cannot think about sense-data or physical realities, and we cannot make or know propositions about them, for such propositions do not exist. Fortunately, however, some objects of thought have physical counterparts called sense-data, though how Mr. Joad can think or assert this on his own theory I am quite at a loss to understand.

This alone seems to me sufficient to condemn his theory, and the innumerable difficulties of detail need not concern us. The judgment that Cæsar crossed the Rubicon "asserts a specific connection between the conceptual objects Cæsar and the Rubicon." These objects are not to be called "ideas"; if they were so called, it would be obvious that the judgment never asserts that our idea of Cæsar crossed our idea of the Rubicon. Mr. Joad wisely prefers to call them "conceptual objects," and I at least have not the remotest conception of what these are, if they are not old-fashioned ideas, nor have I the slightest conception as to what is meant by the "specific connection" between them. I can only think though I am precluded from doing this on Mr. Joad's theory—that it is something like the connexion between sense-data moving about in space.

Propositions are apparently true or false according as the conceptual objects which they are about have or have not physical counterparts. At this stage Mr. Joad reintroduces one of his "facts." "That which makes a belief"—I think he must mean a proposition here—"that which makes a belief true is a fact not about the object of thought, but about its physical counterpart." This shows that I was wrong in identifying "fact" and "proposition" above, because no proposition, however much it may seem to be so, can really be about physical counterparts. If this "fact" is not a proposition, I do not know what it is. But such details do not greatly matter. Truth

and error depend on the same relation existing between conceptual objects on the one hand and their physical counterparts on the other. This helps us not at all unless there is a thought which can somehow apprehend both the conceptual objects and the physical counterparts; but this, according to Mr. Joad, is impossible. Incidentally, I should like to know whether the relationship between sense-data is itself apprehended by thought or not. Even if it were apprehended by thought, this would not be sufficient for our purposes, since before we can make use of it, we must be able to think that it is the relationship between the sense-data. A complete separation between perception and thought, between sense-data and conceptual objects, cannot explain truth and error, unless that separation is somehow overcome.

I must, therefore, reject Mr. Joad's theories and seek the light elsewhere. Even if I endeavoured to swallow all the assertions which Mr. Joad makes, I could not believe that a proposition asserting a relationship between conceptual objects was true or false according as that relationship did or did not exist between physical counterparts. It would be false only if the proposition (or the thinker) asserted that the relationship between the conceptual objects implied a similar relation between the physical counterparts; and this it neither does nor apparently can assert. If I assert a connexion between conceptual objects, and that connexion exists between these objects, then manifestly I judge truly, whatever connexion exists or fails to exist between other objects. Unless I think something about these other objects, it is surely nonsense to say that I am in error or have made an erroneous judgment about the objects which alone are the objects of my thought. There can be no error in a proposition or in anything else unless somebody believes it to be true; and the error must be relative to what it is about, and cannot be a relative to what it is not about. However useful it may be to

divide up the living work of thought into propositions, we ought not to let ourselves forget that all-important truth. Thinking is as necessary to error as it is to truth, and I venture to suggest it is the attempt to deny this, which is ultimately responsible for all Mr. Joad's difficulties.

I feel that it is a little unfair to criticize without offering my own views for criticism, and for that I apologize. But circumstances over which I had no control have compelled me to write this in a hurry, and my paper is already too long. I had hoped to finish by expounding my own view briefly, but I fear I must leave it to be gathered from my criticisms and from the indication of it which I gave at the beginning.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on April 4th, 1927, at 8 P.M.*

XI.-- SENSATION AND ATTENTION.

By IVY MACKENZIE.

THERE is no definition of sensation which does not at once open the way to interminable dispute. We all know that sensations in some way depend on stimuli which impinge on the central nervous system; that these stimuli have their immediate origin either outside or inside the organism; that sensiferous organs or tissues have something to do with the selection and reception of these stimuli; and that a perceiving mind, or consciousness, or equilibrated unity of the organism is essential to the existence of a sensation as such.

Considerable confusion has arisen from assuming too readily that sensation must be present to any organism which possesses what are called sensiferous organs, and which reacts to environmental stimulation. Motility is, of course, the outstanding feature of animal life, and such motility involves not only the motor elements, but also sensory elements whose correlated influence evokes the co-ordinate response. In the humblest animals, in which a differentiated neural structure has not yet appeared, the stimuli are presumably, for the most part, chemical: their reception is chemical and their motor effect has a chemical basis. In more complicated grades of animal existence special tissues participate in special functions: this holds good on both the receptor and motor aspects of activity.

There is, however, a third aspect of organismal unity which is apt to be overlooked, and which, until recently, has received too little attention in experimental biology. This aspect of organic life comprises what is known as the internal regulation of the organism. To the classical researches of Haldane on the

physiology of respiration we are indebted for the demonstration of this principle. By the elaboration of refined technique and carefully controlled systems of measurement, he has shown how comparatively constant the internal conditions of respiration remain, even in the presence of considerable variation of the external conditions which influence respiratory activity. For observational purposes he makes an abstraction of the respiratory system which is designed for the supply of suitable proportions of respiratory gases to the tissues through the blood. The central feature of this activity is, of course, the gaseous content of the blood. Its receptive and motor aspects are to be found in the sensiferous structures of the respiratory mechanism on the one side, and in the muscular reactions of respiration on the other. The most appropriate symbol for representing this conception of the respiratory system is that convenient fiction, the "simple reflex arc," whose value consists in its anatomical character. The reflex arc is composed of (1) an afferent nerve fibre, with its peripheral terminal joined to a sensiferous surface and its central terminal connected with (2) a central connector nerve fibre in which the internal regulation occurs, and this in turn is connected with (3) an efferent or motor nerve fibre, joined to a structure in which is manifested the motor reaction of the organism. These three components of the reflex arc are represented in a comprehensive view of the respiratory mechanism. The receptor surface of the respiratory reflex is in the lungs, and the stimuli depend on the atmospheric conditions. The central or connector apparatus is in structures in the base of the brain known as the respiratory centre, and the effector or motor side of the arc is comprised in the system of motor nerves and muscles which perform what is regarded as the respiratory act.

What has transpired in the course of recent physiological research is the constancy and stability of the central, or connector, or regulatory apparatus, and the dependency of this stability of

regulation on an extensive series of reactions in different parts of the body which can be demonstrated by chemical methods. The behaviour of the respiratory centre depends on the properties of the blood in which it is bathed. Chief among these properties are the carbondioxide content of the blood and its alkalinity. It has been found that the carbondioxide content of the blood depends on the relative pressure of carbondioxide in the alveoli of the lungs, and it has been found, further, that the pressure is so regulated by the respiratory movements as to be practically constant. On the other hand, the alkalinity of the blood is regulated by the action of the kidneys and liver. The chemical reaction of the blood, which tends to be influenced by absorption from the digestive tract, is regulated by the kidneys and liver in such a way as to preserve a constant degree of alkalinity.

Correlated with these influences of the blood on the respiratory centre is the influence of the alveolar distension on the respiratory centre through the vagal nerves. The effect of distension of the lungs is to inhibit inspiratory and initiate expiratory discharge of the respiratory centre, while deflation produces the opposite effect. Both inspiratory and expiratory discharges continue until they are again stopped by distension or deflation. The vagal nerves are thus the afferent or sensory limbs of the reflex arc, whose peripheral sensiferous terminals are stimulated by distension and deflation of the alveoli. This stimulation evokes muscular responses which are co-ordinate with the influence of the chemical properties of the blood on the respiratory centre, the effect of these properties being the regulation of the degree of energy of the inspiratory and expiratory discharges.

The striking feature of respiratory activity is not merely the manner in which the constancy of the *internal milieu* is preserved, but the extent to which the borderland between the respiratory mechanism and its environment is under control. With a very elementary knowledge of anatomy it is possible to imagine a

diaphanous or atmospheric state of all those parts of the body which do not belong to the respiratory system. We are then left with a visible and tangible organism capable of movement, and in such movement exhibiting an adaptation to environment. Its body framework consists of the chest walls to which are attached the muscles for movement. Its brain is the respiratory centre ; its sensory nerves the vagal nerves from the lungs and peripheral nerves from the skin ; and its motor nerves the nerves to the muscles of the chest walls. We leave the heart to maintain the circulation and to supply the necessary nourishment, and the kidneys and liver are left so as to control the alkalinity of the blood. Our imaginary organism, once it has started to move, will continue to move. Its morphological conformation does not lend itself to orientation, so it moves like a jelly fish. Its adaptive reactions are designed for the inhalation of its atmospheric medium. Its first inspiration produces a distension of the alveoli, with a resultant respiratory discharge causing deflation : the deflation is followed by a discharge which evokes the next inspiration, and so on. Meanwhile the liver and kidneys are regulating the reaction of the blood, which reinforces the respiratory discharges according to the needs of the organism. Examination of the carbondioxide pressure in the alveolar content will reveal a remarkable constancy, in spite of variation within considerable limits in the inspired air. Vary the content of the inspired air, or vary its pressure by placing the "organism" under increased or diminished pressure in a chamber, and it will at once exhibit its "discomfiture" by behaviour which will tend to maintain the normal conditions of its environment. It will appear to make an effort to retain the average pressure of carbondioxide in its alveolar air ; any deviation from the normal hydrogen-ion content of the blood will be followed by respiratory discharges calculated to restore its equilibrium : in other words, its efforts will be directed to a regulation of its external and internal environment, so that

it may continue to exist after a manner which conforms to the average behaviour of the "species" to which it belongs. Even at high altitudes these efforts may culminate in an acclimatization in which it betrays none of the distressful signs and symptoms incident to its sudden transference to such abnormal conditions.

I am not familiar with the distinctions which characterize the various schools of psychology, nor am I convinced that these schools have clear and well-defined notions of their own peculiar doctrines, but I am certain that there are those among them which, if presented with our respiratory animal, would have no hesitation in attributing to it the faculty or capacity for sensation. Is its behaviour not the expression of sensation? Does it not move? Even if its movement be essentially respiratory, does it not incidentally move from place to place, and change its position? Does its movement not vary with the medium in which it is placed? Is it not highly sensitive to the chemical and barometrical properties of that medium? Is it not at one time more excited than at others, and does it not in that respect betray emotional reaction, even although it cannot talk about it? Does it not, in spite of all this, preserve its identity as an organism, at the same time gradually fading into its environment in so far as it regulates its environment by preserving a constancy in the carbondioxide pressure of its alveolar air? If it has not purpose and intelligence in its eyes, it shows these qualities at least in its pulmonary sacs. Admittedly it does not reproduce its kind, but this is an aspect of organic reaction with which, so far the psychologist is not concerned. Of course, its sensations may be only an epiphenomenon. What it feels when it wriggles in its efforts to control its environment and its *internal milieu* may have no meaning for its behaviour, but these sensations represent the crude awakening of consciousness, the early dawn of the light which is destined to reveal the external world in its fulness to the higher orders of animal life.

These reflections on the reactions of our imaginary animal are applicable to the interpretation of the behaviour of organisms in the lower range of existence. The circle of function through the amoeba from environment and back to environment would presumably, if analyzed, show the capacity for regulating reception at the surface, for maintaining a constancy of metabolic conditions within the protoplasm, and for behaving in its movements after a manner characteristic for its kind. On the strength of these performances it has been credited with consciousness, and so with sensation. (Binet.)

On the other hand, there are those who would hesitate to attribute consciousness to the unicellular representatives of sentient nature, but who yet would be prepared to find in mentality an explanation of the behaviour of worms, spiders, fish and fowl. In any case, there can be no doubt about the wisdom of the dog and the horse, and as for the anthropoid apes, does their appearance and behaviour not demonstrate conclusively that they are actuated by the motives and conclusions which influence the human species? There is admittedly something very plausible about this attitude. As we ascend the animal scale there appears to be a gradual differentiation of structure concomitant with the ability on the part of the animal to seek a wider range of activity in search of food and in escape from danger. Highly specialized receptor surfaces and organs bring the animal into closer contact with a greater variety of environmental stimuli. Mechanical contact, vibratory waves in material media, ethereal waves, gravitation, and chemical agencies of infinite variety are among the agencies from which a selection is made by these surfaces, and the selected stimuli, after appropriate correlation, eventuate in reactions which are characteristic for the animal.

But a closer scrutiny of the problem would reveal the probability that the systems related to each of these special sensory

surfaces betray no more evidence of mentality than the respiratory system of our imaginary animal. In the animal world hunger is the main impulse, and mandibular activity and locomotion are the chief means of its satisfaction. This is at least one way of expressing the outstanding characteristics of animal behaviour. But what do they mean when put to the anatomical and physiological test? By the chemo-receptors of oral sense some stimuli are selected, others are left: those that are selected traverse the afferent fibres to the brain where they impinge on a "digestive centre" comparable with the centre for respiratory regulation. For although a "digestive centre" has not been the subject of the same comprehensive and exact investigation as the "respiratory centre," there is considerable evidence from comparative anatomy that such a centre exists. The experimental production of diabetes by injury to a localized portion of the medulla suggests that there is in this region a neural nexus which, if it does not control carbohydrate metabolism, is at least, under certain conditions, a factor in the disturbance of that metabolism. It is, moreover, a common experience in medicine to find grave disorders of nutrition associated with disease of that part of the brain known as the hypothalamus. It would appear, then, that on the basis of such fragmentary evidence as we possess, we would be justified in concluding that there are at least two centres concerned in the integration and correlation of the nervous processes which regulate digestive processes. Nor would this be inconsistent with the comparison which we have attempted to institute between the respiratory and digestive systems, for again in the case of disease there is evidence which points to the probability that there is a respiratory centre in the hypothalamus, as well as in the medullary region. That being so, we are entitled to carry out comparison a stage further and to suggest that the principles of regulation which we found to pertain to the case of respiration are applicable also in the case of digestion.

The course of the circle of digestive function passes through the body from environment to environment in a way which once more can be represented figuratively in a reflex arc. Allowance must be made for the fact that while respiration, like circulation, is a constant activity, digestion occurs at longer or shorter intervals, depending often on chance and fortune. On the receptor side of the reflex the specialised surfaces connected with the nerves of taste and smell make their peculiar selection from environment. The stimuli, generated in virtue of that selection, travel along the gustatory and olfactory nerves to the base of the brain where they integrate and are correlated in the centres referred to. It may be inferred that these centres are subject also to the influence of the blood in which they are bathed. It has been pointed out that the respiratory centre is extremely sensitive to any alteration in the hydrogen-ion content of the blood, and that part of the function of other organs of the body is the maintenance of a constancy of that content. Other definite properties of the blood have been recognized and estimated by standards of reference. The sugar content and urea content are known to vary only within very narrow limits under average conditions, and variation outside these limits is recognized as evidence of disease. The liver, the pancreas, the muscles and the special organs of so-called internal secretion, produce substances which find their way into the blood stream, and by their presence there exercise a determining influence on the extent to which the stimulation of the nerves of taste and smell complete the circle of digestion through the reflex arc. Starvation of the tissues through deprivation of food or through waste by excessive exercise produces a change in the *internal milieu* corresponding to that which occurs when the respiratory system is exposed to chemical and barometrical variations in the atmosphere. An adjustment of the internal regulation is the objective to which the various activities subsidiary to digestion combine to contribute. In the course of this

process the "digestive centre," which is irritated by the disturbance of the *internal milieu*, is rendered prepotent for the gustatory and olfactory nerves, with the result that the tastes and smells of environment acquire an enhanced value for the organism in its struggle to regain its normal equilibrium. In the struggle the manifestation of reaction on the motor side of the reflex are those movements which are immediately concerned with digestion, but these movements are not necessarily the first to come into play; they may be and are, as a rule, postponed until by virtue of locomotion, evoked by the same stimuli, the animal reaches its food. A living organism is not confined within its skin. An essential part of its economy is the halo of "tastes" and "smells" which, though regulated by its own sensiferous organs, determines up to a point its movement from place to place. This movement from place to place is associated with and co-ordinated with the flow of salivary juices and the muscular movements of digestion. Both depend on the correlation in the central nervous system of stimuli in the halo and in the *internal milieu*, and both contribute to a restoration of that regulation or equilibrium which enables the animal to continue its characteristic existence. There is no evidence in this behaviour to suggest the presence in the animal of a psychic equivalent of hunger, choice or effort, in the sense in which these terms are symbolic of the attributes of conscious experience. Any such evidence is just that which has been adduced in another age in support of the plausible superstition of witchcraft, and in our own age in support of the plausible superstition of the subconscious.

Of still greater significance for the movements of animals are those environmental conditions known to physicists as the vibrations of ethereal waves. A very extensive series of such waves has been recognized: at one end of the series are the Hertzian electric waves, at the other the X-rays. From the Hertzian to the X-ray end of the series the wave length diminishes

to $\cdot 00000005$ mm. and the number of vibrations increases to 6,000,000,000 billions per second. This represents the range of the series so far as it has been ascertained by experimental methods. Some ten octaves of the series are revealed in the solar spectrum, and the human eye is sensitive to a range represented by something over an octave, that is to say, to a range in which the length of the wave varies from $\cdot 0004$ mm. to $\cdot 0008$ mm., and the vibration rate from 400,000 to 800,000 billions per second. There is thus in the case of human vision a very limited selection of stimuli from these environmental agencies. Of course the limitation and character of that selection has been determined by computation based on visual discrimination, and the results of analysis from this point of view suggest that the human eye can distinguish from 150 to 230 pure spectral tints. In addition to this it is suggested that it is possible to detect various degrees of intensity and purity of tone representing from 500,000 to 600,000 visual discriminations.

But the biological phenomena of vision cannot be fully or satisfactorily explained by physics and psychology. In its most rudimentary form the eye is present as a spot of pigment in the outer or covering layer of the humblest animals. It is doubtless the function of that spot to select from the ethereal waves such as are suited to induce adequate stimulation, and so contribute to the elicitation of such movements as are necessary for the life of the animal. The primitive organ of vision is essentially a handmaiden to the locomotor apparatus. The selection is made presumably from that part of the series of ethereal waves which stimulate the human eye, but there is no reason to believe that in the lower orders of animal life such stimulation ever eventuates in anything resembling sensations of colour and brightness.

This is probably the most convenient stage in our argument to take up a definite stand on the meaning of sensation and on the problem of its presence as a factor, or product, or epiphenomenon

in animal and human experience. My contention is as clear as I know it is provoking, and it is this:—There is no sensation without consciousness, there is no consciousness without voluntary attention, and the capacity for voluntary attention has emerged with the human fellowship. I may also be able to anticipate some irrelevant criticism if I define the attitude from which this outlook is presented. Phylogeny is a key which opens a door to one of the rational conceptions of human experience; but I look at the phylogenetic series from the standpoint of the human subject and not from the standpoint of a protozoa or a fish or a mammal: the flounder, the serpent and the ape have much in common with man, but man has practically nothing in common with any of these.

We may revert now to our consideration of the eye as a sensiferous organ for the selection and reception of environmental stimuli. We emphasise the fact that in the lower orders of creation its activity is related essentially to movements of the body and especially to movements from place to place. As a corollary to the confession of faith which has just been made, it is necessary here to call attention to an important anatomical and physiological distinction in respect of the so-called sensory peripheral system. In human anatomy the term "sensory" has a very vague connotation. It is applied frequently to all peripheral nerve fibres which convey stimuli from their seats of distribution to the central nervous system. This indiscriminate use of the term is apt to suggest that the passage of stimuli to the central nervous system invariably implies the production of sensation. This, however, is obviously not the case, and it is necessary to bear in mind that only an extremely small proportion of the stimuli which reach the central nervous system of the human subject ever produce what is called "sensation." It is therefore advisable to distinguish as far as possible between those nerves which, under normal conditions, mediate in the production of sensation.

and those which do not. The simplest way of doing this is to designate by another term, which will convey no implication of sensation, all those nerves which conduct stimuli to the central nervous system. For this purpose the term "afferent" nervous system has been introduced, and the term "afferent" is applied to a nerve along which impulses travel to the central nervous system, whether or not these impulses result in feeling or sensation of any kind. On first thought we might conclude that under average normal conditions stimulation of the nerves of special sense and of the cutaneous nerves is accompanied by sensation, whereas stimulation of the afferent nerves from the viscera, lungs, heart and kidneys, for example, is not accompanied by sensation. Nor does it appear likely, at first sight, that stimulation of the afferent nerves from muscles, bones and joints, and blood vessels, would be accompanied by sensation. It is a very plausible contention, and one that has been made by some eminent observers in medicine, that sensation is associated with the activity of those afferent nerves only which are distributed to the structures or receptor surfaces exposed to environmental agencies. This hypothesis is based on observations on pain: for it has been found that the pain which often accompanies disease of the internal organs is felt in corresponding parts of the skin and underlying tissues. Thus, in disease of the gall-bladder pain is felt, as a rule, on the right side in the neighbourhood of the gall-bladder. But it is found on close examination that the pain can be explained practically, if not wholly, by excessive irritability of the afferent nerves in adjacent parts of the body wall. Colour is lent to this explanation by the fact that mutilation of the exposed gall-bladder in subjects who are conscious is not accompanied by pain.

We are not concerned here with the validity of this hypothesis, except in so far as it may convey the tacit assumption that the exclusive function of the afferent nerves related to environment is the production of sensation. We may be apt to emphasize the

protective value of sight, hearing, smell, taste, touch and pain, to the neglect of the immediate motor reactions evoked by the same stimuli which contribute to those conscious phenomena. A very short reference to the functions of the eye in lower animals should suffice to prove, in these animals at least, the preponderating, if not the exclusive, relation of light stimulation to motor and metabolic reactions. Light stimulation in the lower animals is comparable in every respect with the stimulation induced by the chemical agencies of smell; allowance being made for the fact that light is more important in some cases and smell in others. The extremely complex and highly organized features of ant life are explicable, not on the basis of intelligence or even on the basis of a simple aggregate of isolated sensations of smell, sight, touch and pain, but on the basis of an organic correlation of varied stimuli regulated by the *internal milieu* of the organism. The *internal milieu*, as we have seen, is of the very essence of the organism: it has its characteristic properties at any given stage of its existence; if it varies from stage to stage of embryonic, larval, or adult life, there is a constancy or regularity in the process of variation during development, and at any one particular stage all the activities of the organism combine to maintain the characteristic process.

In a passing reference to the question of taste and smell it has been pointed out that, if we employ the symbol of the simple reflex arc in the interpretation of the effects of these stimuli, it is found that the stimuli of "oral sense" on reaching the centres of correlation in the base of the brain diverged in at least two directions. On the motor or effector side of the arc some were diverted to the organs of digestion and others to the organs of locomotion. The same principle may be applied to the interpretation of the course of the stimuli selected by the organs of vision. It will be found, however, that in this case the end-result is expressed, for the most part, in the locomotor apparatus. As a distance

receptor the organ of vision is designed to bring the animal into relation with a wider range of environment. This, of course, is also the function of the organ of smell, but smell is more immediately related to the chemical sense of taste, and in the vertebrate animal has its receptor surfaces in close proximity to the oral cavity. The eyes lie at some little distance from the mouth and nose and more on the dorsal aspect than on the ventral or extreme fore-end of the body. They would appear from their site to be more closely connected with the locomotor than with the vegetative functions of the body.

Even in actinians where the body is radially symmetrical and where there is as yet no central nervous system, limited locomotor reactions may occur in response to stimulation by light. The character of the reaction differs in different species: closure in the presence of light is the ordinary form of response for most actinians although there seems to be good evidence that a few react in the opposite way.

It is in the bilaterally symmetrical animal that we get the first indication of the determining influence of light on animal movement, and it is important to recognize at the outset that the potency of this influence depends on this bilaterally symmetrical conformation of the organism. All the higher invertebrates and all the vertebrates are of this morphological type. A head or oral end is distinguished from a tail or aboral end, and the tissues or organs of locomotion are disposed on each side of a median axis. The movements of humbler animals depend upon the specific irritability or selective activity of the receptor surfaces, upon the disposition of these surfaces, and upon the regulation of the selected stimuli within the organism. Symmetrical elements at the surface of the body have the same irritability; unsymmetrical elements have a different irritability. Those at the oral pole or head end have greater irritability than those at the aboral pole or tail end. These are some of the fundamental conditions

which determine the orientation of the organism either towards or away from a source of stimulation.

It is, however, in the vertebrate animal that we find the morphological data best suited to an interpretation of the effects of light. The fish has a very extensive and highly specialized series of sensiferous organs. Its locomotor adaptation depends, not only on its eyes, but on a peculiar system of lateral line organs which radiate over the surface of the body. The afferent fibres from these lateral line organs are correlated in the brain stem in close proximity to, and probably in close relation to the site of correlation of the vestibular nerves which are distributed to the semi-circular canals. The semi-circular canals have to do with the maintenance of the equilibrium of the body in a normal posture; with their nerves they constitute the afferent limb of a reflex arc whose motor limb nerves are distributed to the muscles of movement. In the maintenance of the normal posture of the animal in the water this system exercises a tonic effect on the musculature as a whole. All the somatic muscles on one side of the body come under the influence of impulses which are generated in the vestibular apparatus on the same side, and these stimuli are elicited not from environment but from alterations in the posture of the body itself. Closely allied in function to these stimuli are those which arise locally from contractions of the individual muscles and from movements in the tendons and joints induced by these contractions. This system of afferent fibres from muscles, tendons and joints on the one hand, and from the vestibular apparatus or semi-circular canals on the other, has been designated by Sherrington the "proprioceptive" system; it is primarily concerned with stimuli which arise inside the locomotor mechanism of the organism, and in this respect is distinguished from the "enteroceptive" system which is concerned with stimuli arising in the viscera, and from the "exteroceptive" system related to stimuli elicited by environmental

agencies. Now the co-ordinate reactions of a fish in its peculiar medium depend on a correlated regulation of all these systems. For descriptive and analytical purposes in experimental research it is important to make arbitrary divisions of this kind, especially when they are made on an anatomical basis with a well-defined physiological significance. Anatomical and physiological research have revealed, not only the properties which characterize each of these systems, but the manner in which one system is related to the other.

Of special importance to us is the way in which the exteroceptive organs of vision are related to the axial musculature which is under the control of the proprioceptive system. The anatomical basis of this relation has been defined in a commissural band of nerve fibres which links together the motor nerves to the eye muscles with the motor nerves which stand in relation to the vestibular apparatus and thus to the whole proprioceptive system. There is effected through this concatenation a co-ordinate and harmonious combination of reflexes. The visual reflex is subserved by an anatomical basis consisting of an afferent tract from the eye to the motor nuclei in the base of the brain and motor tracts from these nuclei to the muscles of the eye; additional motor tracts proceed from the same region to the axial musculature. The vestibular reflex is subserved by an anatomical basis consisting of afferent tracts from the semi-circular canals to the base of the brain, and these structures in the base of the brain are connected with the motor nerves to the axial musculature. As we have pointed out these two reflexes are connected by commissural or association tracts which extend from the base of the brain in front of the optic centres back through the medulla, where they form junctions with the vestibular centres, and still further in a caudal direction into the spinal cord, where they enter into relation with the local proprioceptive centres of the segments of the trunk.

If it be possible from this crude description to visualize the central nervous mechanism which underlies the relation of vision to posture, it will be understood how readily and automatically the reflex response to light finds expression in axial movement, and how this axial movement, in turn, reverberates through the proprioceptive system producing a conjugate movement of the eyes co-ordinate with the movement of the body. The stimuli from light, from the semi-circular canals, and from muscles, joints and tendons, are so correlated by a system of internal regulation that the body responds in a co-ordinate manner to deviations from its normal posture, as well as to movements of its axial articulation. If the body be placed in an abnormal posture relative to the three dimensions of space, it will tend to right itself by muscular contraction evoked by stimulation from the vestibular apparatus in which the three dimensions of space are represented. At the same time the eyes will turn in co-ordinate response, in virtue of the association between the vestibular and optic centres. Similarly, turning of the head on the trunk, or movements of axial rotation in a more caudal part of the trunk, will be accompanied by conjugate deviation of the eyes.

All this happens automatically. There is no choice, and therefore no volition. No intelligence is implied: there is therefore no evidence of sensation or consciousness. The response to light by the locomotor apparatus is just as inevitable as the flow of salivary juice on stimulation of the nerves of taste. As the ant responds to the stimulus of smell, so the fish responds to the stimulus of sight. But smell has no psychic significance for the ant; there is a fatality in the response which precludes the evidence, even in an attenuated form, of any of the attributes of conscious experience. In the same way, if, in the case of the fish, we apply the term vision to the function of the eyes, it is not thereby implied that during any part of the process of reception,

correlation and motor response, there is any awareness of what is going on. Something corresponding to what we call a picture of the external world is focussed on the retina. The metabolic activity incident to this process of selection constitutes the stimulus which may or may not be adequate to evoke a response. The adequacy of the stimulus will depend, not only on the "picture," but on the predisposition of the central neural nexus or system of internal regulation to distribute the stimuli in a co-ordinate and appropriate fashion. If it be adequate we say that the animal is attracted or repelled by the "object"; if the "object" be a crumb the newly hatched chick will be attracted and in the process there will be highly complex and finely co-ordinated movements of the eyes, head and mouth relative to the rest of the body, and of the whole body in approaching and in picking it up. If the object be Lloyd Morgan's blundering puppy, then the moor-hen, which had previously found no adequate stimulus in similar "pictures," will at once make a characteristic response.

The association which obviously obtains between different complex reflexes related to different receptor surfaces is regarded by many students of animal behaviour as evidence of psychic phenomena in lower animals. Animals are trained to perform particular acts under conditions such that the normal stimulus to the act is always accompanied by a second or artificial stimulus of a different type. After many repetitions it is found that a physiological response occurs to the second or artificial stimulus alone. The secretion of saliva has been used by Pavlov as an indicator in experiments of this kind. The secretion of saliva occurs physiologically from stimulation of the nerves of taste in the mouth or from the sight of food. It is assumed for some reason that the occurrence of salivation on seeing food has something to do with thought or with the idea of food. Pavlov varied the conditions for salivation by introducing a new stimulus for

the dog by ringing a bell for dinner. It was found, after repeated presentations of the food with the physiological and artificial stimuli combined, that the animal had acquired the "capacity" to salivate when the stimulus from the bell alone was in operation. This he called a "conditional reflex." The conditional reflexes are regarded as evidence of "associative memory"; associative memory is, in turn, the evidence of consciousness; a "psychic centre" for salivary secretion, it is contended, has been clearly demonstrated.

This far-reaching conclusion strikes at the very root of our fundamental contention that consciousness has emerged with the human fellowship. That being so, it is necessary that it should be subjected to critical examination, and in so doing we shall confine ourselves to consideration of (1) its origin, (2) its implication, and (3) its real significance.

(1) There is little doubt but that this way of looking at sensorimotor reactions as the elements of consciousness has its origin in the Newtonian hypothesis, adapted by the theory of evolution to the interpretation of biological phenomena. The order which that hypothesis discovered in the mechanical world of physics and astronomy was found to exist in the physical and chemical constitution of inorganic matter itself. It was only a somewhat more difficult problem to reduce the proximate or ultimate conditions of protoplasm to laws of motion and mechanical adjustment between its constituent elements. Living matter is but a more highly differentiated form of inorganic matter: inorganic matter consists of molecules and molecules are made up of atoms. Atoms are indestructible: they preserve their identity in an ever-changing world, and the energy involved in these changes remains constant. When life appeared on a lifeless planet a new and more highly differentiated series of atomic and molecular relations was gradually instituted. A new circle of reactions was formed. From inorganic matter there arose organic matter,

which, after a time, exhausted itself and returned to the grave of the inorganic. That this is no travesty of the position may be seen in the words of Huxley, who was the main protagonist of the theory at the end of last century. In his *Life of Darwin* he speaks of the "fundamental proposition of evolution that the whole world, living and not living, is the result of the mutual interaction, according to definite laws, of the powers possessed by the molecules of which the primitive nebulousity of the universe was composed. If this be true, it is no less certain that the existing world lay potentially in the cosmic vapour, and that a sufficient intelligence could, from a knowledge of the properties of the molecules of that vapour, have predicted, say the state of the fauna of Britain in 1869 with as much certainty as one can say what will happen to the vapour of the breath on a cold winter day."

There could be no more uncompromising statement of the mechanical view of the world, a view which is obviously based on the assumption of the universal validity of the Newtonian hypothesis and its applicability to the interpretation of the meaning of life. But the hypothesis had to break new ground before it became applicable to the phenomena of sentient nature. The theory of natural selection was the medium on which it was destined to flourish, and a striking instance of the pretensions it displayed is to be found in Lankester's article on Zoology in the *Encyclopædia Britannica*: "Darwin, by his discovery of the mechanical principle of organic evolution, namely, the survival of the fittest in the struggle for existence, completed the doctrine of evolution, and gave it that unity and authority which was necessary in order that it should reform the whole range of philosophy. The detailed consequences of that new departure in philosophy have yet to be worked out. Its most important initial conception is the derivation of man by natural processes from ape-like ancestors, and the consequent derivation of his

mental and moral qualities by the operation of the struggle for existence and natural selection from the mental and moral qualities of animals. Not the least important of these studies thus initiated is that of the evolution of philosophy itself. Zoology thus finally arrived through Darwin at its crowning development : it teaches, and may be even said to comprise, the history of man, sociology and psychology."

The cardinal weakness in this way of stating the problem is that it begins at the wrong end, and seeks to explain the mind of man by the behaviour of animals the higher by the lower. The phenomena of biology are not taken as a field of material for investigation on its own account. There is no recognition of the possibility that sentient nature may have laws of its own which cannot possibly be suggested by generalizations which explain the movements or relations in chemistry, physics and astronomy. The constitution of the atom has meaning for the constitution of the molecule, and the relations of molecules have something to do with the changes in matter : but that is not to say that the application of this doctrine can lead to an understanding of the features that are peculiar to an organism that regulates its internal and external environment, maintains its identity and reproduces its kind. However valuable may have been the contributions made to our knowledge of living processes by the application of the ideas and technique of physics and chemistry, these deal with but isolated aspects of the problem, and fail in general to take account of the organism as a whole.

When we leave the high-sounding phrases of these champions of evolution and come to the more concrete work of a great modern physiologist, we see that in adopting these hypotheses Sherrington himself would appear to be perfectly well aware of their limits. He makes use of the convenient fiction of a " simple reflex arc," out of which he builds " compound reflexes." The relations of compound reflexes are analyzed and described in terms

of "interaction", and "simultaneous" and "successive" combination. It is not difficult to see in all this the pattern of atoms and molecules, and their relations as they are adumbrated in the mechanical hypothesis. But Sherrington makes no claim to an elucidation of the facts of conscious experience in terms of reflex activity. In the introduction to his more systematic treatment of the problem he defines precisely the aspect of organic integration which he abstracts for experiment and observation. "The integration of the animal organism," he says, "is obviously not the result solely of any single agency at work within it, but of several. Thus, there is the *mechanical* combination of the unit cells of the individual into a single mass. . . . Integration also results from chemical agency. Thus, reproductive organs, remote from one another, are given solidarity as a system by communication, that is, of chemical quality; lactation supervenes *post partum* in all the mammary glands of a bitch subsequent to thoracic transection of the spinal cord severing all nervous communication between the pectoral and inguinal mammae (Goltz). In digestive organs we find chemical agency co-ordinating the action of separate glands, and thus contributing to the solidarity of function of the digestive glands as a whole. . . . Again, there is the integrating action effected by the circulation of the blood. The gaseous exchanges at one limited surface of the body are made serviceable for the life of every living unit in the body. By the blood the excess of heat produced in one set of organs is brought to redress the loss of heat in others, and so on." But he goes on to point out that "the integrative action of the nervous system is different from these, in that its agent is not mere intercellular material, as in connective tissue, nor the transference of material mass as by the circulation; it works through living lines of stationary cells along which it despatches waves of physico-chemical disturbance, and these act as releasing forces in distant organs, where they finally impinge."

In his analysis of the integrative action of the nervous system he makes a further abstraction which it is important to recognize. His standards of reference are the movements elicited and observed in experiment. His "simple reflex is probably a purely abstract conception," and its great value consists in the fact that it has anatomical significance. The conception of integration which he elaborates is constructed out of motor effects. Of course he chooses the sensory surfaces and speculates on the course of events along "the living lines of stationary cells" and through the centres of correlation, but the motor phenomena are the indicators which guide him to his conclusions. At no stage in the course of the stimulus from the receptor surface to the movement does he assume the occurrence of anything in the nature of a sensation, and in this he avoids the pitfall into which those who have blindly followed the Newtonian and Darwinian hypotheses have fallen.

It is obviously implied in the application of these hypotheses to the study of animal behaviour that somehow and somewhere during the passage of a stimulus from a receptor surface to a motor organ a sensation is produced. It may be vague and it may be vivid; it may be an essential part of the process or may only be incidental, or may be an epiphenomenon. If it occur during a light reflex the sensation will be sight, and if it occur during a reflex to injury the sensation will be pain. When, as a result of the simultaneous or successive combination of reflexes, different reflexes acquire a time relation, then the function of what Loeb calls "associative memory" comes into play. According to this authority, "associative memory is present when an animal responds upon hearing its name called, or when it can be trained upon hearing a certain sound to go to the place where it is usually fed. The optical stimulus of the place where the food is to be found and the sensations of hunger and satiety are not qualitatively the same, but they occur simultaneously in the

animal. The fusion or growing together of heterogeneous but, by chance, simultaneous processes is a sure criterion for the existence of associative memory." It is in simple beginnings like these, we are told, that consciousness originates. As differentiation proceeds and new sensiferous organs come into play the range of activity extends, and the field of consciousness becomes wider and more definitely determined. There is a gradual transition from the dim and hazy consciousness of the lowest animals till it reaches its culmination in the consciousness of man as we know it. The sentient activity which enables the amœba to gather food or avoid barren objects is but the lowest and simplest manifestation of that which reveals the secret of nature to the greatest intellect.

There is evidence in all this of the same attitude inspired by the same obsession, and the obsession is that the *principle of continuity* is universal and unfailing, that its rule is established in the relations of sense and intellect, and that these operations are reducible to motions, to mechanical adjustments of the proximate and ultimate conditions of protoplasm. There is an orderly procession of events through atoms, molecules, inorganic matter, colloidal substances and protoplasm: in due season it arrives at unicellular organisms, followed by a series of resultant innovations which become gradually more complex and more highly differentiated till man is reached. *Pari passu* with this series there is the appearance of elementary sensations which are also gradually differentiated and specialized, and in their association and integration ultimately result in perception, cognition and volition, with all the human attainments that these attributes imply, including "the evolution of philosophy itself." . . . "the history of man," "sociology and psychology."

This principle of continuity is not inherent in the Newtonian or in the Darwinian hypotheses. It has been imposed by authority in a spirit of dogmatic assertion on the assumption that to disprove

the absoluteness of continuity is to destroy the firm basis of evolution. Those who accept continuity assume that throughout the series the differences are in degree and not in kind. They begin with the admitted fact that there is a relation between human sensation and nervous matter, between thought and brain, and take for granted that the evolution of the sensory organs in lower animals is accompanied by a corresponding evolution of sensation: but the parallelism offers no solution so long as the nature of sensation itself remains a problem, and, so far, physiology has not got beyond the stage of describing it and of giving an account of it in terms of anatomy, physics and chemistry.

In questioning the validity of the contention that there is a continuous development of sensation and consciousness from the lowest manifestations of sensitiveness to external impressions up to the highest acts of intellect, we have shown that the principle of continuity has been introduced gratuitously into the Newtonian and Darwinian hypotheses to fill obvious gaps in a certain conception of a world order. One of these gaps is admittedly that which separates man from the brute creation. We are therefore satisfied to stand by our original thesis that there is no sensation without consciousness and that consciousness has emerged with the human fellowship.

(2) Having dealt with the origin of the principle of continuity in the evolution of sensation, we turn now to certain implications involved in the acceptance of that doctrine. We do not deny, of course, that consciousness of sensation is in some way related to the activity of anatomical elements concerned in sensori-motor reactions. What we do deny is that sensori-motor reaction, even in the case of the organs of special sense, necessarily involves sensation. We question the precision of a definition of sensation such as that given by Bain when he says that "by sensations, in the strict meaning, we understand the mental impressions,

feelings or states of consciousness resulting from the action of external things on some part of the body, called on that account sensitive." In this definition there is implied a causal continuity of events from "external things" to "consciousness." Bain, moreover, fails to take cognizance of the fundamental distinction between sensibility of a receptor surface in relation to an anatomico-physiological reaction and sensibility of the same receptor surface in relation to conscious appreciation of something happening in the body or in the outside world. Even very highly organized organs of special sense, like the eyes and olfactory organs of higher invertebrates, while extremely effective for adaptive movements, cannot be said to afford a conscious experience of the objects that attract or repel. The proposition that they do so contains the elements of contradiction. It is taken for granted that the sensori-motor reaction is the indispensable condition of the sensation. It follows that the accuracy and reliability of the reaction, as expressed in behaviour, is the criterion of the accuracy and reliability of the sensory feeling. This applies not merely to the sense of vision or of smell or taste, as the case may be, but also, in the same degree, to the sense of space, and consequently to the sense of time. The peremptory response to light and the infallible response to smell are carried out by the locomotor apparatus after a manner which indicates a correspondingly perfect sense of space. That ants can find their way home on the ground and bees in the air with unerring accuracy is an indication of memory which implies an extraordinary delicacy of the sense of time. The lower animals are thus seen to possess in a high degree, and in perfect association, all the elements which are supposed to enter into the production of consciousness and if we are to estimate the degree of mentality from the reliability of sensation, and the reliability of sensation from the perfection of behaviour, then we must surely credit the higher invertebrates with a state of consciousness scarcely inferior to

that with which man himself is endowed. This, however, is obviously inconsistent with the first principle of the theory of continuity in evolution, for, according to that theory, consciousness in the invertebrates is only dawning. Therefore it should still be in a stage preparatory to its gradual extension and definition concomitant with the expansion of the neopallium on the surface of the brain of the higher vertebrates: it should still be a long way off from its final development in man, the grey matter of whose cerebrum has been specially elaborated for its consummation.

(3) It remains to enquire as to the real significance of representative phenomena adduced as evidence of mind in the animal world. From such phenomena we choose for consideration (a) "associative memory," as observed under natural and experimental conditions. (b) "intelligent behaviour" in animals, and (c) migration of animals.

(a) What, then, is the real significance of the complicated association of combined and successive reflexes occurring naturally in animal behaviour and under experimental conditions such as those arranged by Pavlov, for example, in the case of the dog where the ringing of a bell induced a salivary flow? Does it necessarily follow from the evidence either in the one case or in the other that there is a conscious experience, however vague, either preceding, concomitant with, or following the motor reaction? Or is it even probable that there is any such sequence of events? Or is it not more likely that the coördinate expression in one motor effect of a variety of stimuli is simply a biological event of anatomico-physiological significance? An appropriate answer to these questions may be found in the conclusion to be drawn from certain well-recognized phenomena in disease.

When gall-stones produce a certain degree of irritation, either through inflammation or through impaction in a muscular duct, an attack of colic ensues. The features characteristic for such

an attack are pain in the region of the gall-bladder, and in the adjoining part of the body wall, from contraction of the muscles of the body wall over the region of the gall-bladder, headache, vomiting, sweating, shivering and rise of temperature. There is a definite anatomical substratum for the whole series of events, and that substratum can be visualized as a complex neural reflex. The receptor surfaces are in the gall-bladder or gall duct, the afferent limbs of the reflex are the afferent paths through the sympathetic system to the spinal cord, and the afferent paths through the vagus nerve to the base of the brain: there are thus two afferent limbs to the arc. There are also two primary centres of correlation, one for the first limb in the spinal cord, and the other for the vagus in the base of the brain. The impulses generated in the gall-bladder and gall duct give rise to foci of irritation or foci of increased irritability in the centres of correlation referred to. The reactions on the motor side of the arc are due to the spread of stimuli from the foci of irritation to the corresponding motor elements. The firm contraction of the abdominal muscles follows stimulation of their motor nerves, and the vomiting is due to stimulation of the "vomiting centre" in the medulla on which the stimuli through the afferent fibres of the vagus impinge. The sweating, rigors and fever are a consequence of stimulation of the centres further forward in the brain which control the temperature of the body, and the conduction of the pathological stimuli is along afferent paths which accompany the vagus or sympathetic or both. The pain in the region of the gall-bladder is immediately due to pathological excitability of the afferent nerves related to the first focus of irritation in the spinal cord, whereas the headache is due to excessive tenderness in the nerves to the head, whose centres are related to the second focus of irritation in the base of the brain on which the afferent fibres of the vagus converge.

This is the anatomical basis of the gall-stone syndrome. It

is comparable in every respect with the structural substratum which subserves such physiological reflexes as those to light or to the stimuli of oral sense. The behaviour of the organism is characteristic for the condition; the reaction may be said to be true to type.

Repeated attacks, by a process of facilitation, render recurrence more ready. The nerve tracts and centres involved become more susceptible to the abnormal stimuli. Nervousness and apprehension are the emotional features developed as a result of the anticipation of their onset; the whole nervous system becomes more excitable and the pathological foci of irritation relatively more so. After a time it would appear as if a "gall-stone habit" had been acquired, and circumstances which previously produced no effect might now be instrumental in eliciting an attack. We have observed cases of this kind in which, after removal of the gall-stones by operation, the attacks continued to recur. In one case an incident producing great grief and anxiety might suffice to provoke a recurrence. In another an attack of gastric influenza, by inducing vomiting, might excite a repetition. The incidence of such attacks, in the absence of the original "exciting cause," namely, the gall-stones, shows that there may occur in disease, and quite independently of consciousness, phenomena which are strictly comparable with the "associative memory" and "psychic centres" of salivation in animals.

"Students of animal behaviour," says Herrick, "are in the habit of investigating the ability of animals to make simple associations by training them to perform particular acts under conditions such that the normal stimulus to the act is always accompanied by a second stimulus of a different type. After many repetitions the response may be obtained by presenting the second or collateral stimulus without the first." As so often happens in disease, we have the spontaneous occurrence of

conditions for observation which are even more illuminating than those artificially produced in the laboratory. By the training of repeated stimulation the highly complex reflex of gall-stone colic becomes a habit. Its phenomena include a series of characteristic movements and sensations. When the habit has been well formed, when the resistance of the whole concatenation of reflexes which participate in its exhibition has been sufficiently lowered, it may show itself in a way that might seem to be spontaneous; for, as we have seen, it may remain even after operative treatment. On closer examination, however, it is found that in the formation of the habit receptor surfaces, other than those in the gall-bladder, have become susceptible to adequate stimulation. Emotional sensibility may become so increased that stimuli through the eyes, or ears, may be effective. Irritation through the stomach may set it in action. Any condition which would produce vomiting may tend to set in motion the whole habit, of which vomiting has been an integral part.

The real significance, then, of the data of "associative memory" is that they are neither more or less than physiological reflexes with an anatomical basis, and are strictly comparable with the pathological reflex of gall-stone colic. They are neither indicative of consciousness nor are they the conditions of which consciousness is a resultant.

Of course, the presence of pain involves the existence of a state of consciousness. On this account the objection may be raised that the pain of gall-stone colic is, on our own showing, the strongest evidence of consciousness in "associative memory." But to make this contention is to change the whole ground and course of the argument. Pain is admittedly part of the conscious experience of the gall-stone syndrome; the sensation is present because it is a human experience; there is no evidence to suggest that sensation would form part of a gall-stone reflex in lower animals.

The course of the main argument has been along the following lines. The advocates of the theory of "associative memory" put forward the plea that consciousness originates in an association of reflexes, and to this process they apply the misleading term "associative memory." It is assumed quite gratuitously that each sensori-motor reflex is accompanied by a sensation, and that a combination of such reflexes implies memory. The gall-stone reflex was cited as an illustration of the mode of action of the nervous system. It shows in one of its aspects the mode of origin of a conditioned reflex. It is only, however, by a vain stretch of imagination that anyone can postulate the presence of a "psychic centre" for the gall-stone syndrome. The receptor surface in the gall-bladder is not a sensiferous organ for the selection of stimuli. It bears no resemblance to the cutaneous surfaces to which some physiologists assign end-organs of pain for protective purposes. The motor reactions are purposeless, even when the stone is still present, for by no conceivable movements can the subject get away from the stone, and under no circumstances can it be ejected by vomiting. The syndrome simply shows one of the ways in which the nervous system behaves in disease. It shows that when noxious stimuli persistently originate in a particular part of the body, they tend to irradiate along more or less definite and constant nerve tracts, and in the process of irradiation evoke first one reflex and then another. It shows further that, in virtue of what is described as "facilitation," these reflexes become combined so that a stimulating agency acting on any one of the reflexes may set the whole combination in action. This is precisely what takes place in those spontaneous and experimental instances of combination of reflexes which are cited as illustrating "associative memory" in animals. Not even the most consistent advocate of the theory of continuity in mental evolution would suggest that sensations from the gall-bladder made a contribution to the rise of consciousness.

As a matter of fact, the original fallacy is to be found in the use of the term "associative memory." It takes for granted that a combination of reflexes, simultaneous and successive, implies the activity of "conscious" memory. But it does nothing of the kind. The term "memory," if at all applicable in the context, is applicable only in the sense in which it was used by Hering as a "general function of organized matter." In this sense the term is applicable also to the phenomena described in the gall-stone syndrome, and the conception to which it refers was elaborated long ago by Creighton in his dissertation on "Unconscious Memory in Disease." Memory, as generally understood, implies consciousness; it implies the recognition of certain relations in time. There are admittedly certain temporal relations in the combination and succession of reflexes which are described as expressive of "associative memory": similar relations are present in the gall-stone syndrome: but these relations are the temporal relations of an ever-changing world, and are essentially different from those of "conscious memory" in which the relations of experience are integrated by a "sense" of time.

(b) In attempting to appraise the significance of the phenomena of "intelligence" in animals, I feel I am on very treacherous ground. It is a ground that has been cultivated with industry by the devotees of the doctrine of continuity in evolution. Care has been taken to cover up all the gaps and holes by an ingenious "flight of ideas." The plan is inspired by the Spencerian view that "the first dawnings of intelligence are developed through the multiplication and co-ordination of reflex acts." We seem to have met already with something suspiciously like this: for the appearance of "associative memory" was also attributed to the "multiplication and co-ordination of reflex acts." In explaining the rise of intelligence, however, a new concept, the concept of "instinct," is introduced: and instinct covers two kinds of

actions, those which are impulsive and those which are purposive. In the last resort both actions are explicable in terms of constituent reflexes. When instinct, or a combination of instincts, is suffused with the spirit of awareness, intelligence results. The spirit of awareness is presumably a product of sublimation of the sensory elements of reflexes.

How very seductive the whole story is! There is a steady progress from atoms, through molecules, protoplasms, cells, reflexes and instincts, to intelligence, accomplished by a gradual addition of a little more and a little more of the "elixir of life."

But is there really anything in the instinctive reactions of animals to warrant us in regarding their behaviour as intelligent in the ordinary sense? Here, again, we must insist that if continuity be the underlying principle the difference in intelligence between man and animals must be a difference in degree and not in kind.

There is no need to emphasize the intimate nature of the relation of consciousness to intelligence; what Bethe lays down as a criterion for consciousness may be taken as applicable in the case of intelligence. "An animal," he says, "that is able to do the same things the first day of its existence which it can do at the end of its life, that learns nothing, that always reacts in the same way upon the same stimulus, possesses no consciousness." If we accept this criterion for consciousness as an index of intelligence in the animal world, we search in vain for examples of behaviour with either quality. From its earliest days a domestic animal, like the dog, which is subjected to the influence of training, exhibits only the instincts which are peculiar to its breed. The collie makes a poor hunting dog, and the hunting dog cannot be trained for sheep under any circumstances. There is, moreover, a well-marked limitation of instinctive reaction within any particular breed, for the collie that is petted will never make a good sheep dog. Any variation of average behaviour may be ex-

plained on the assumption that "conditioned reflexes" have been called into play. The instinct is exhausted in the associative act. There is no evidence of a supplementary faculty to devise short cuts, to economize experience, or to form new habits out of the old ones by a process of abstraction.

What passes for intelligence in animals is something quite different from that which is regarded as intelligence in man. It is the emotional colouring displayed in the instinctive behaviour of animals which is so misleading and which gives rise to the illusory semblance of intelligence. To appreciate the significance of this contention it is necessary to remember that emotion of some kind or other is a feature of all behaviour, whether in man or in the lower animals. But emotion is subject to the same division as memory. Just as there is a tissue memory which is unconscious, so is there emotion which is unconscious; and such unconscious emotion is to be contrasted with the conscious emotion which one observes only in the human subject. The emotion of the animal world is unconscious because the behaviour is unconscious. Emotion in the human subject is conscious only when it is a feature of such aspects of human experience as are conscious at the time.

Our argument, then, is that while all animal behaviour is instinctive, some aspects of human behaviour are instinctive, other aspects are intelligent: all behaviour, both animal and human, may be described in terms of emotion. Now, the behaviour characterizing the bonds of companionship between man and the animals which are his friends, is the main evidence of animal intelligence. But it is a well-recognized fact that bonds of companionship may be emotional as well as intelligent, may be more emotional than intelligent, or may be emotional without being intelligent. Emotion, as is well known, is closely related to instinct, and man has his instincts, and therefore many of his emotions, in common with the lower animals. Fear and affection are displayed among men and domestic animals in a large degree

in similar reactions, and it is this which constitutes the bond of sympathy. It is no wonder that man, who has formed a companionship with his dog or his horse, should impute to his friends the thoughts that are passing through his own mind regarding the relationship. The reciprocal displays of affection in the mutual adaptation are essentially instinctive ; they are intelligent only on the one side, and perhaps not very intelligent at that.

However tempting may be the inducement to pursue the consideration of the relation of reflexes to instinct, and of instinct to emotion, memory and experience, that is not the main line of our argument. The crucial question for us as regards instinct is in those examples of provident action which are not only prior to, but can, in no sense, be the result of individual experience. The extremely complicated hypermetamorphosis observed in some insects cannot be explained by any theory of heredity or of selection which assigns the dawn and process of the series of phenomena to experience of the individual. The case of *sitaris humeralis* is cited as an illustration, not only of a double metamorphoses, but of one bound up with a remarkable adaptation in parasitism. "The parasitic larva introduces itself into the cell of a bee, at the same time that the prudent bee secludes her own egg with an ample store of honey for its nourishment during hatching. The cuckoo egg hatches a little earlier than the victim, on which it at once proceeds to feed. In this way it utilizes for its own enlargement the material which it was bound to get quit of, so that it might use the empty husk as a raft in which to float on the sea of honey. After exhausting the honey, it becomes an eruciform grub and then a pupa, finally emerging in the imago form. The instinct here is various (we treat it as one, the end being single): the selection of the bee because of the synchronism of development, the double change, even the strange shifting of the tracheal apertures on the side of the larval body. (These, at first dorsal, so as to be above the 'load-line' of the

floating raft, sink as the tide recedes and reach the usual place, near the lower margin of the body). The union of changing habits and altered structure is of special interest: which is the prior of the two?"

Phenomena of this kind raise questions of far-reaching importance. They imply the presence, not merely of faculties unlike those of which we have knowledge in man, but the possibility of an active external influence in the origination and direction of the instincts. If interpreted as phenomena of conscious experience such consciousness cannot be the dim, vague presentation of phenomena demanded by the continuity theory as the precursor of the human mind. For that the end-result is too precise; it is too inevitable. But, if we preclude the participation of consciousness, we must assign to the instinctive faculty possibilities that cannot be described in terms of sensori-motor reaction as at present conceived. The theory of reflexes may give an adequate account, so far as it goes, of certain instinctive reactions, but it does not explain the highly complicated behaviour of insects, nor yet the equally mysterious behaviour of certain vertebrates.

(c) That this is so is well illustrated in the phenomena of migration in fish and birds. There is no need to consider this illustration further than to point out that, if migration be interpreted in terms of reflex theory, the guiding sense in locomotion must be vision and the impelling sense must arise from agencies which have something in common with those agencies related to organs of special sense. But the physiological conception of distance and immediate receptors affords no clue to the mystery. "The sense of sight, essential to a knowledge of landmarks, is utterly insufficient to account for the success that attends birds which travel by night, or in a single flight span oceans or continents."

Tyndall can scarcely be accused of super-naturalism, and yet he says, "Believing, as I do, in the continuity of nature, I

cannot stop abruptly where our microscopes cease to be of use. Here, the vision of the mind authoritatively supplements the vision of the eye. By an intellectual necessity I cross the boundary of the experimental evidence and discern in that matter which we, in our ignorance of its latent powers, and notwithstanding our professed reverence for its Creator, have hitherto covered with opprobrium, the promise and potency of all terrestrial life." Do we not then discern in the mystery of migration something which is comparable with efforts of mind to transcend the limitations of vision by means of microscopes and "intellectual necessity?" For the bird there is neither telescope nor compass, neither latitude nor longitude, and no polar star to guide its course. It exhibits, in the words of Paley, a "tendency to action prior to experience," but do we not see in that tendency a guiding principle or design more reliable in its methods, though not perhaps more mysterious in its origin than the armamentarium which man has fashioned out of his conscious experience with his own hands to take him from place to place.

Instead of being able to explain intelligent and conscious behaviour, we find that instinctive behaviour itself requires explanation, and no explanation is forthcoming when we consider it in the light of such knowledge as we have of reflex processes. The position, then, would seem to be that we have looked in vain to physiology and to animal behaviour for evidence of phenomena which would suggest the dawn of consciousness. Thus far the evidence we have considered points to the conclusion that certain basal instincts are common to animals and man, but animals find a wider range of activity through special instincts that cannot be understood in the light of any known standards of reference, while man seeks a wider range of activity through the reactions of his conscious experience. Put in plain language, that formula simply means that animals do a limited number of things, and these they do very accurately. They eat and breed and protect themselves, and they travel long distances by means

unknown. The behaviour of different kinds of animals is very different, but the behaviour of any one kind varies only within very narrow limits. Any particular animal does pretty much the same thing during the whole of its existence. There is no evidence that it ever does or makes anything according to a plan of its own. Man, on the other hand, does and makes a great variety of things. He eats, breeds and houses himself, but, in addition he is the author and finisher of all the achievements which, standing to his credit, give him a very special place in creation. He is able to do what he does because he is conscious. His memory is conscious because he can recollect and anticipate. His emotions are conscious because he feels the changes that occur in his own body. His will is conscious because his actions may be determined by reference to the past and future. He has a sense of beauty, and of goodness and truth, and his conduct is inspired by a sense of righteousness. All these activities and attributes are manifestations of conscious experience. Sensation in all its forms is but one aspect of that experience, and it is essential to its integration. Animal behaviour may be interpreted in terms of human behaviour, but human conduct can never be interpreted in terms of animal behaviour.

It would appear that we must look elsewhere for evidence of the dawn and development of consciousness. Lindsay in his introduction to "The Philosophy of Bergson" quotes from Kant that "it is a great and essential proof of cleverness and insight to know how to ask reasonable questions." It is a singular instance of perspicacity in research that a great authority on the evolution of the brain should have turned his attention to the problems of primitive man and his activities in the earliest records of civilisation. Not that Elliot Smith expected to find there evidence of the relation of thought to the neopallium, although a relation of some kind cannot be seriously questioned. The important point is that in the history of primitive man and in the dawn of civilisation we have the first signs of those activities which give him a

special place in the world of creation ; and these activities and this special place are, in some way, associated with the growth of his brain.

Whatever may have been his immediate antecedents in the animal world, he has a brain which, in relative size and in complexity of structure, is peculiar to himself. True, there are other brains belonging to humbler creatures, in which some of the parts are relatively larger than the corresponding parts in man ; this applies particularly to the taste centres or vagal lobes in certain fish and to the optic lobes in birds. But the neopallium which, in man, is generally regarded as associated with intelligence and consciousness, is out of all proportion to that observed in any other creature.

There is little doubt but that man had his origin in lower animals. When he emerged from the brute creation he took with him the structural basis on which he was destined to erect his own peculiar edifice. He took with him the central nervous and somatic organization which he had in common with the highest mammals. Our contention is that this was not an event which was gradual and insidious in its incidence, as the conception of continuity would have us believe : it was rather something that "happened," just as something happened when inorganic matter "happened" to become organic, and as presumably "happened" when birds emerged from the reptilian order, for birds are still a puzzle, not only to the students of behaviour, but to anatomists. The question which was asked in the case of the insect as to the relation of changing habits to altered structure may be repeated here : which is the prior of the two ? There are more familiar instances in biology where the course of events is not determined by what would appear to be the conditions in operation at any particular instant, but by a final function which the course of events has in view. As one of these may be cited the development of the mammalian heart. In foetal life there is no necessity for a separation of venous from arterial blood, the

blood being supplied to the heart by special vessels from the mother. Yet during the course of embryonic life the heart is completely developed, and is functionally perfect at the time of birth. The physiological conditions of embryonic life did not necessitate this, except in so far as the function of a double circulation was in view. The question here, again, is surely apposite : with regard to the relation of structure and function, which is the prior of the two ?

I know this view is not very popular, that it savours of the doctrine of design, and that it may be said to be inconsistent with the well-recognized facts of evolution. I cannot help that : in any case I am not under the embargo of a logical necessity imposed by the cult of continuity, and I cannot see that adherence to the theory of evolution within limits is inconsistent with belief in design.

I believe that provision was made for consciousness in the progenitors of man, but that consciousness itself became a function of organic life only when man came on the scene. The sense of time and of space was not simmering in the physiological sensibility of the lower animal world from the amoeba upwards, even although all animals exhibit, according to species, a specific order of events in the course of their development and life history, and preserve in their movements (in those animals, at least, that are bilaterally symmetrical), a characteristic orientation in space. This order of events in life history and predetermined orientation to the three dimensions of space is fundamental to the activity of consciousness at its dawn.

It must always remain a matter of speculation just how much is *a priori* in conscious experience. This is not a matter which can be estimated by anatomical and physiological consideration. In view of the organic equipment of the higher apes, the structural perfection of their sensory and motor organs, and the activity of the primitive "urge," as the Freudians would say, it is remarkable how little they can do. Structurally their eyes are the same as

those of man, their upper limbs consist of the same anatomical elements as the human arm and hand, they are supplied with a perfect apparatus for articulated speech, and yet they have never been known even to mend a fire which travellers have left, and their chatter has no more significance than the noise of crows. We are left with the impression in the higher apes, just as in the foetal heart, that there is a highly complicated organization ready for new activities if only function would call it into play.

It is to the data of conscious experience itself, however, that we must look for evidence of what is presumably *a priori*, and the visual aspect of experience is perhaps that which lends itself best to the enquiry. Vision is both instinctive and voluntary. We have, in common with the lower animals, as we have seen, a visual apparatus which, in function, is related to the whole axial skeleton. Movement of the eyes is co-ordinate with movement of the head, and movement of the head with that of the trunk, and movement of the trunk with movements of the limbs in locomotion. These co-ordinate movements in animals are instinctive, and the instinctive basis to his bodily movements man has in common with his progenitors.

Observation of disturbance of vision in man suggests that there are certain aspects of that function which are instinctive; that, like the instincts of animals, they always remain the same from the first and do not improve by experience. They depend essentially on the configuration of the organism, on its bilateral symmetry, and on its inherent biological relationship, through the eyes and semicircular canals, to the three dimensions of space. The aspects of visual function which would seem to be *a priori* concern instinctive reaction to singleness, distance, relative size of objects in space, up-ness and down-ness of space, and left-ness and right-ness of space, the stability and mobility of objects in space. I am perfectly well aware that all these aspects of vision may be, in a sense, aspects of educated conscious experience, and that we cannot talk about objects, for example, without running

the risk of becoming involved in the problem of the object itself as an elaboration of conscious experience. This problem, however, has nothing to do with the present argument. The fact remains that there is an instinctive reaction in man and animals to the one-ness or singleness of objects, that this does not vary in health, but that single objects give double pictures in disease. In the higher mammals and man there is instinctive reaction to stereoscopic vision; this function always remains the same in health. That there is a stable reaction to stimulus produced by the size of an object is shown by the fact that experience produces no change in the size, whereas in disease objects may appear very large at one time and very small at others. The up-ness and down-ness of space is obviously conditioned by our posture, and this in turn is determined, as we have seen, by vision. The same may be said of right-ness and left-ness, and disturbance of this instinctive function is seen in mirror-writing. Reaction to the stability and mobility of objects in space is also predetermined. A stationary object remains stationary for both man and animals in their instinctive reactions. In disease, again, we have evidence of disturbance of this reaction when an object such as a wall is seen to advance or recede, or when level ground appears to undulate. This is produced by disturbance of the central neural nexus, which subserves the instinctive visual reaction. The phenomenon, of course, is represented in conscious experience, otherwise we could not be aware of it.

On the strength of these observations it is contended that at the very root of our conscious experience lie certain reactions to space. It may be said also that our reactions to time have an *a priori* basis. A very definite and invariable sequence marks the progress of events in lower animals. At the very root of consciousness lies a reaction to the before-ness and after-ness of certain elements in the sequence. I am aware it may be held that this implies the presence of consciousness already. But this is not the point, for we are not dealing with "causes" of the

origin of consciousness: we are dealing with the conditions which obtain at the borderland between predetermined and indeterminate conscious behaviour. We are trying to discover how far and in what way there are fundamental conditions of consciousness in the time order of events; and we find that reactions occur instinctively to the before-ness and after-ness of events in human behaviour. This, again, is shown in human disease: in certain hysteroid and epileptic states, where reaction occurs in response to a confusion between before-ness and after-ness, where the reaction is to presentations which have not yet occurred. That this is not a confusion of thought, in the ordinary sense, may be concluded from the fact that these patients explain that, at times, events which are occurring and which did not occur before, present to them an aspect of familiarity. This, of course, is an occasional experience apart from definite disease, but it emphasizes the contention that reaction to a definite order of events is an *a priori* condition of conscious experience.

These arguments are adduced in support of a doctrine of time and space which many of us had accepted before we knew anything about biology or disease. They are presented here in this form because they appear to have significance for the view that consciousness emerged with the human species. Whatever else happened when man emerged, he became busy. He set to work, and within the framework of the temporal and spatial order presented to him began to select and arrange things. Discrimination must have been a feature of that selection and arrangement, and the abstraction involved in such discrimination might form the basis of counting. His social instinct found expression in speech and other signs and symbols, and primitive chatter no doubt enabled him to make short cuts and economize his experience by comparing things with his neighbours. However mysterious the whole history of conscious experience must remain, it is not difficult to imagine that it had its earliest manifestation in such conditions.

The absolute and fundamental difference between man and the lower animals is in the capacity to abstract and to devise economic methods by conscious processes. His achievements are the evidence of these processes. Where are the achievements of even the anthropoid apes? What have they to bestow for a heritage except the brutal instincts which they themselves have inherited? They are born, they eat and drink, incidentally do some depredation, breed their kind, and then die.

If to conscious processes are to be attributed all the achievements which are peculiar to man, we know at least so much about consciousness. The attempts that have been made to determine its more intimate character have not resulted in any consensus of opinion. To regard it as a field or a stream has certain advantages, especially for those who find it convenient to describe mental phenomena in terms of physics. There are certain very ordinary criteria which give us quite a good idea of what consciousness is. A person is conscious when he knows where he is in time and place, when he is able to do, and does, the things he should do under average conditions, and when he appreciates, through the senses, the things he ought to appreciate. This is only a very general indication of the tests which one applies in finding out whether or not a person is conscious, or to what extent consciousness is present. There is implied in this the presence in consciousness of a great many co-operative activities. Although these cannot be regarded as distinct from one another in any sense, they may be said to comprise memory, sensation, cognition, will and attention.

Attention is the greatest common factor in consciousness. We estimate consciousness in the light of its associated motor activities, and attention is the best standard of reference because its mechanism is essentially motor. It enters into every experience which has conscious reference, into memory, sensation, cognition and will.

It is imperative, however, in the study of attention to recognize

it, as we recognized memory, in two distinct forms. We saw that memory may be "unconscious," as in tissue memory or heredity, or that it may be conscious as in recollection. In the same way there is a form of attention which is unconscious or spontaneous and which is characteristic for instinctive reaction. This is to be distinguished from "voluntary" attention, which pertains to actions of conscious experience and is a feature of all those activities which are an expression of consciousness. Spontaneous attention has a very limited range compared with the extensive range of voluntary attention. In vision, for example, spontaneous attention is involved in the conjugate movements of the eyes and in the co-ordinate movements of the head and trunk: voluntary attention, in vision, on the other hand, contributes to all those activities which give the visible world the meaning and interest it has for us.

That attention is in its essence a motor phenomenon is clearly demonstrated by disease. Maudsley points out that "the person who is unable to control his own muscles is incapable of attention." Since normal activity means the perpetual change of attitude to an ever-changing environment, it follows that attention must be, in normal states, always on the move. Normal active attention is seen in the harmonious response to the perpetual coming and going of inward events which constitute the conscious life. Morbid concentration of attention, or morbid introspection, finds its expression in inhibition, not merely of voluntary movement, but of all the movements of the body, vegetative as well as somatic. Morbid attention is the most obvious factor both in artificial and in spontaneous hypnosis. The inhibition of voluntary action in such cases is due to complete or partial interruption of conscious processes by interference with the normal play of attention. Another aspect of disordered attention is seen in ecstasy, in which the automatic movements, gestures and attitudes are obviously beyond the control of voluntary movement. There is thus an average well-balanced process of attention which corresponds to

the average normal processes of consciousness in its other aspects of memory, sensation, cognition and will. Disorders of attention may, of course, be described in terms of any one or more of these cognate processes, for attention is a feature of consciousness which pertains to them all.

There may appear to be at first sight an exception in the case of sensation ; but sensation also will be found to be indissolubly associated with voluntary movement, and so with voluntary attention. We have seen that when vision passes from the instinctive to the voluntary phase the instinctive conjugate and axial reactions become co-ordinate with superimposed movements directed by voluntary attention. It is the constant change in the way of looking at the object which gives it fullness of meaning and interest, and, after all, the object itself becomes a part of conscious experience to be manipulated by experience as occasion may demand.

The same thing holds good as regards the other sensations. They are effective in consciousness in virtue of voluntary attention and movement ; in the motile parts of the body the sensations that are most refined and discriminative are those which are related to the parts that are capable of the most complicated and versatile movements. The human hand is the highest product of animal creation. What has been done by its means is told in the history of man. Its efficiency is due no less to its sensory discrimination than to its motor dexterity, the one function being in reality complementary to the other. Its motor and sensory qualities are alike related to voluntary attention. The relation of abnormal attention to abnormal sensation was illustrated well in some affections of the hand due to injury during the War. In these cases a wound which might, or might not be, serious was followed by excruciating pain of the nature of a " *tic doloieux*." The illness was in every case associated with abnormal attention of some kind or another directed to the injured limb. The morbid anxiety of the debilitated soldier, expectation of another

attack of pain, premonition regarding the future, all combined to produce a morbid concentration of attention on the seat of pain. The interesting and important fact is that the incidence of an interruption of attention or of consciousness, due to delirium, was followed in some cases by cessation of the disturbance.

It is a well-known fact that distraction of attention, or the substitution of a state of elation for one of depression, is accompanied by the disappearance of certain forms of disturbing sensation. It is possible even, by voluntary attention, to dissipate or prevent the onset of pain. John Hunter, in his "Lectures on the Principles of Surgery," gives an account of an interesting personal experience. He was asked to allow himself to be magnetized, and he relates that when he went he "was convinced that everything was calculated to effect the imagination. When the magnetizer began his operations, and informed me that I should feel it first at the roots of my nails of that hand nearest the apparatus, I fixed my attention on my great toe, where I was wishing to have a fit of the gout, and I am confident that I can fix my attention to any part until I have a sensation in that part. Whenever I found myself attending to his tricks I fell to work with my great toe, working it about, etc., by which means I prevented it having any effect on me." This is not only a very good illustration of the relation of attention to sensation, but it is a very sound parable for daily life.

Instances could be multiplied indefinitely of the relation of disordered sensation to disordered attention on the part of the victim, reinforced by a combination and succession of disordered attentions by relatives and doctors. We are not here concerned, however, with medical evidence except in so far as it is accessory to other evidence of a biological character. Such evidence as we have submitted appears to sustain our original contention that there is no sensation without voluntary attention, and no voluntary attention without consciousness, and that consciousness has emerged with the human fellowship.

If I have failed to give a clear rendering of my views, I may be permitted to throw them into relief by quoting from a recent volume by Parsons on "The Theory of Perception." Dealing with the consciousness in Lloyd Morgan's moor-hen before its first dive, he says, "Just before Lloyd Morgan's moor-hen made its first dive we may conjecture that its stream of consciousness was composed of a relatively placid undercurrent of *cœnæsthesia* upon which were superposed the iridescent ripples of perpetually changing perceptual patterns. The cognitive and affective responses to these patterns were relatively slight, and carried merely such traces of meaning as to stimulate mildly only such peaceful instinctive dispositions as curiosity, play, and so on. When the puppy arrived upon the scene the errant awareness of the moor-hen was suddenly activated by a peculiarly insistent presentational pattern. Stimulation of the visual, auditory, and perhaps olfactory and other organs gave rise to a perceptual pattern of quite exceptional potency in arousing awareness to a situation of profound biological meaning. It is to that *situation as a whole* that the bird reacted. In some manner, which we must later attempt to explain as best we can, the constellation of objective sensations are welded subjectively into a unit pattern from which there emerges a meaning which is different from and more than the sum of all the meanings which can be attributed to the individual factors which make up the pattern. Thus the pattern as a whole may be regarded as the unique stimulus to certain innate dispositions, arousing in them the emotion of fear. thus giving rise to the appropriate instinctive response a dive."

I do not believe that Lloyd Morgan's moor-hen was conscious. I do not believe that it ever had "*cœnæsthesia*" or a "constellation of objective sensations," or that it ever made "cognitive responses" of any kind. These attributes are the fabrication of consciousness and obviously had their origin in the human mind.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on May 9th, 1927, at 8 P.M.*

XII.—THE WORLD AS MEMORY AND AS HISTORY.

By H. D. OAKELEY.

THE object of this paper is to ask for a reconsideration of the character of human experience from a point of view which gives more weight to what it seems best to describe as its historical form, and recognizes that this form is not merely the condition through which an experience which can be abstracted from it comes to us, but belongs to its essential nature. We are thus, as I think, led to recognize certain fundamentals which characterize our experience prior to its treatment by systematic thought, as a subject of scientific knowledge. prior to any analysis, as, for instance, into elements of sense, and of thought. These characteristics, instead of being adventitious, as may otherwise be supposed, are in this view more original in the order of reality than are such properties of experience as have been determined by the actual course of human development, in the necessities of the struggle for existence, individual and social.

The argument will point to the conclusion that recognition of the necessary nature of our experience, as thus interpreted, will make more intelligible the emergence in it of those higher forms which are inexplicable on a purely naturalistic or empirical account of its course, and not truly explicable from the standpoint of the Absolutist philosophy.

The historical form, then, cannot be entirely transcended by our minds. It cannot, namely, be transcended in the sense that the transcendental knowledge thus made possible would be unaffected by the fact that it is knowledge for minds which have learned to know through historic experience.

The title of the paper is, I am afraid, not altogether happy. What exactly is signified by history, and by memory, can only

become clear through the exposition of the nature of the world of experience, as I conceive it. I hope that the use of these terms and their conjunction will be justified, but it will probably appear that "creative memory" would be on the whole a better expression. The title, moreover, may possibly suggest affinities which can hardly be claimed with Mr. Douglas Fawcett's work "The World as Imagination." I was not acquainted at first hand with this book, when I was working at the substance of the paper. I have since had an opportunity of consulting it, and have found that I am not dealing with the same problem. The subject of the World as Imagination is (as I understand) the nature of manifestation of ultimate reality. This is neither the thought of Hegel, nor the will of Schopenhauer, but creative imagination. My problem, on the other hand, is that of the true nature of our actual experience. This nature, or character, is real, or necessary for any experience of finite minds, and this, I think, is capable of demonstration on *a priori* grounds. But I do not assume that it is ultimate, in the sense that there is no reality beyond, from which it proceeds (in some sense of that ambiguous term) or which must be postulated, as more original.

Though afar off in point of view, I should like to follow Kant in his general idea of the *status*, so to speak, of our experience. It must be what it is for minds like ours in the midst of a world presenting elements in some respects foreign to our consciousness. But the forms of our experiencing are not necessarily the forms of mind universally. Moreover, and here I cannot claim to have learned my thesis in the school of Kant, the nature of our experience, and therefore our knowledge is inexplicable unless it is interpreted as conditioned by a positive quality in the activity of the subject, resulting from the limitation of finite mind, and its strain to overcome this limitation, determining the experience of value, or the categories of the principle of personality.

With reference again to the significance of the term *Memory*, in comparison with *Imagination*, I am in agreement with Mr. Fawcett so far as to recognize that the basis of all constructions of the world, alike the scientific-practical construction for the necessities of existence, and the logical-scientific for the purposes of consistence and coherence must be the vision of experience as the sphere of an activity of consciousness, or at least describable in terms of an activity "enjoyed" in our own consciousness, and not identical with logical thought. But the description of this vision as of *Memory* rather than of *imagination* is intended to convey the idea that the reality and content of its world is in part determined by history. As will be argued, history itself is in great part the product of factors contributed by mind as personal.

Yet, as generated by an action and reaction between mind and factors which are alien to it, it represents the form of experience, which gives to finite mind the peculiar characteristics of its objects a little lower than those of the philosophic heaven—the worlds of angels who may be conceived to possess knowledge only as contemplation. Lower, that is, in the order of truth as the rendering of experience in a system, coherent and fully self-consistent. For, through the gateway of practical experience enter in the sources of inconsistency and incoherence, a dualism more invincible than any which lies in the path of contemplative knowledge, a more alien "Otherness." For here we meet with error in more resistant forms. Not, perhaps, lower for every criterion. For as will be argued, the endowment of the historic event, as it develops into something real for finite consciousness, is value, and this is further imparted by the activity of memory, transfiguring the event.

It has been said that the term *creative memory* would, perhaps, better indicate the interpretation of the facts of memory which is involved in my thesis. At the outset, however, it is

more important to emphasize the fact of the conditioning of the activity of mind in our knowledge by its involution in the unique experience of present actuality, occurring for us as event, and constituted by mind as a thing of history. And this emphasis is suggested when we characterize the form of mind as memory, thus noting that it is bound in some degree to an actuality, however thin and poor in its own nature, however unmemorable apart from the prior work of memory.

Memory and the Present.

Although I am not concerned generally with psychological interpretations of memory, the truth recognized, I believe, by most psychologists, as also epistemologists, that our knowledge of present experience, whether conceived as primarily of objects or of events is largely determined by the contribution of memory, is of great importance to what follows. I should be in agreement with Professor Spearman and other eminent psychologists in their rejection of the doctrine of the specious present, unless this doctrine can admit of the interpretation that much—or most—of the experience we usually call present, involves a direct apprehension of (“compresence” with) the past. I think I can agree with the following:—“Recall—has the nature of an inward observation. Everyone carries about with him a comprehensive though sub-conscious presentation of his whole past experience. Instead of an absolute bringing of the past into mind, there occurs an intensifying of a presentation already existent.”* My interpretation of the significance of the “sub-conscious presentation of past experience,” might, of course, be quite unacceptable to Professor Spearman. I only venture to quote his words as a clear statement of the important psychological fact.

* *The Nature of Intelligence*, Spearman, chapter XIX, Memory Section—Recollection.

The far-reaching implications of the truth that nothing is perceived as object, through its present character for sense alone, have in general been recognized so far as the theory of knowledge is concerned, but not, I think, in all their results for the interpretation of memory, unless in the remarkable form in which the results are used by M. Bergson. As is well known, he reduces the sense-impression to its minimum for consciousness, as meaning nothing but an indication of the action required, and the memory-factor is wholly different in kind. In a striking passage he asks, "How is it possible that the past, which by hypothesis has ceased to be, could preserve itself? Is this not an essential contradiction? We reply that the question is precisely whether the past has ceased to exist, or whether it has simply ceased to be useful. You have arbitrarily defined the present as *that which is*, whilst the present is simply *that which makes itself*. Nothing is less than the present moment, if you understand by this that indivisible limit which separates the past from the future. When we think of this present as about to be, it is not yet; and when we think of it as existent, it is already past. But if, on the contrary, you consider the present concretely, and really lived by consciousness, it may be said that this present consists in great part in the immediate past. Your perception, however instantaneous it may be, consists in an incalculable multitude of recollected elements, and in truth every perception is already memory. Practically we only perceive the past, the pure present being the process -- ever eluding us -- of the past gnawing the future."*

As a description of the psychical facts, this passage appears to me very near the truth. With his doctrine that the conscious experience of memory depends only on the conditions of utility I profoundly disagree, and it seems to be inconsistent with the ascription of qualities of value to the real life of memory. The

* *Matière et Mémoire*, chapter III.

conception of the present as "the very materiality of our existence, *i.e.*, an ensemble of sensations and movements and nothing else." does not admit of the possibility, which his metaphysic appears to require, that the present, made real by its reception into a past in which the mind is living, can become the source of a value which, as past, it will always preserve. Whence does the object of memory derive the value he seems to ascribe to it, if as actual it had no meaning except utility? For the practical summons which calls memory to rise from the unconscious, is always the need for successful life. Moreover, "in engendering sensations in materializing itself, memory will cease to be '*souvenir pur*,' in order to pass into the state of present thing, actually lived." In the view that I shall suggest, in regard to the meaning of present actuality, the memory that constitutes the experience has not ceased to be memory, since all actuality, as the vital experience of finite mind, is historic, and thereby indissolubly united with a real past. It is the sharp dualism of value as between action and memory which must, I think, be overcome, in order to a consistent interpretation of our experience: a dualism involved in such dicta as the following: "It is the necessity of present action which conceals our past from us: it will cross the threshold again whenever we disinterest ourselves in action."

The primary dualism of memory and bare event—a factor alien to mind, in abstraction from its construction as history—must, however, be recognized.

The great value of M. Bergson's contribution to the philosophy of memory, as I understand it, is his luminous exposition of the truth that, in an important sense, we live and have the greater part of our being in the world of memory: this world, whether we call it past or present, being active for us in our now. His conception of its activity seems too narrow, but he has made unforgettably clear that our scene of life and knowledge has a

far greater expansion, or that our mind has, as it were, a much longer historic stretch in its *immediate* grasp than the fragment through which it can at any "moment" contribute to the "alteration of existence." Whether his conception of the relation between present and past is altogether adequate to our experience is what I venture to question. The choice of the word memory as especially appropriate to the life of the mind implies (as already noticed) an attachment of a necessary kind to an experience which is more original in some order of being. How is the nature of this attachment to be conceived, and what is the order to which we are linked by memory? Now, Bergson does not think of the part played in knowledge by his "souvenir pur" in accordance with the idea of Plato's ἀνάμνησις. Apart from other considerations, this would seem evident from his observation—in illustration of the point that the true memory is co-extensive with consciousness—that "a being who dreamed his existence, instead of living it, would grasp at every moment the infinite multitude of details of his past history." The linkage of Plato's ἀνάμνησις is, of course, to a world of universals. Though the particular is the occasion for the activity of reminiscence, it creates knowledge in remembering the universal ideas. The infinite details grasped by Bergson's dreamer must, however they may be enriched in the spiritual world—the world of the past—have their attachment to that reality which we experience, and have experienced, as present actuality. As pure memory, it must be implied that the experience is liberated from those intellectual categories which give a transcript of the flow of life or consciousness, useful for practice but misrepresentative of the true nature of things. In this we may probably see the transformation through which memory becomes the form of the life of the spirit. But there is too great a paradox in its genesis in those blind moments of present actuality, intent on successful existence,

which are presumed to summon from the past only that which has pragmatic meaning.

Reflection on this enigma in Bergson has confirmed me in the view that memory must be conceived as the soul of the bare event, which becomes real in becoming historic, and in its association with memory gains value. The experience of present actuality is, however, essential to the emergence* of value. And by "actuality" I mean not merely that which attends on any "present" moment of consciousness, but that which attends on the meeting of consciousness with data it cannot wholly assimilate.

Memory and the Past.

Turning to another, but kindred, question, on which theories of knowledge are divided—it is necessary to my interpretation of experience that the immediate character of our knowledge of pastness shall be recognized. I am now referring to what has been called the "obvious past." The notion of the "specious present" may have partly originated in the difficulty of conceiving either that our datum in present actuality is an unsubstantial line between past and present, on which we do not pause, or that we can have direct awareness of data already past. Once it is realized that the object of present awareness contains elements which have pastness, and are included in present awareness just because they are past and necessary to the eventness of the present event, the problem of the obvious past is less enigmatic. What we call the past then has no less direct a claim upon our knowledge than the present. It differs greatly in kind from the presentation in relation to which we are still practically active, but the difference is not a difference in the

* This useful word occurs several times in this paper, without the special philosophical significance it has recently acquired.

method of knowledge, as *e.g.* between "knowledge of acquaintance," and "knowledge about." It is a difference in the nature of the object, which, in the case of the present matter of fact in part consists of a factor alien to consciousness, and yet directly entering into experience. This view would agree with M. Bergson's rejection of any theory which makes of the past of memory only a fainter present of sense. Such a view is suggested in F. H. Bradley's image of the stream on which we look down, seeing "right under our faces a bright illuminated spot which ceaselessly widens and narrows its area." The spot is "our now, our present," whilst the rest of the stream is "not in total darkness, but illuminated by a fainter light," which "both up and down stream is shed on what comes before and after our now," this paler light being "the offspring of the present."* It would be otherwise if we might read a meaning probably not intended by Bradley, into the pregnant further hint.

"It is possible that the light of the present may come from behind us, and what reflects the light may also bestow it." I should like to take this as a text for some of the essentials in my idea of memory. But the other part of the simile is more in keeping with his treatment of memory generally. He implies that it is impossible for the mind as memory to know the past, as it were, in its own light, or directly in its true character, abstracted from the single irrecoverable moment to which practical existence gives so overwhelming an importance, but—as I should hold—having a greater concreteness of value. For memory now in the ascendant can bestow safely those treasures, which the robber force of the present need can no longer squander. But "memory," Bradley tells us in his *Essays*,† "is an ideal

* *Principles of Logic*. Part I, chapter I.

† *Essays on Truth and Reality*. XII. Some Remarks on Memory and Inference.

construction of the past, by which the present reality is qualified," and "It is inference as construction."

He explains that he is excluding the question of "the real nature of the past," and merely asking about "the past simply as it is for us." This is also what I would ask. But my question is not, I fear, identical with his, because as I conceive, the real nature of the past must be its nature for finite minds, and its being such does not render it mere appearance, but something that has its final form in relation to these minds, not resolvable into another form for an absolute experience.

"Memory as immediate is to my mind a sheer miracle." And Bradley allows to the future the same logical status as to the past "Events past and future, and all things not perceived exist for us only as ideal constructions." This view, which follows from the denial of reality to the time-process, does not appear to give weight to the testimony of consciousness. It seems more in accordance with this testimony to recognize a profound difference in the quality of our relation as knowers to the future, except only in so far as the future is merely for us a projection of the past. The notion of the future in this latter form is indeed what we may perhaps regard as the primary concept of the future, as it might be for a merely epiphenomenal consciousness, in which the principle of practicality had not yet arisen, and experience signified only an awareness of the stream of change with which it was bound up. In our experience, this primary future is no more a smooth inevitable scene which "must come to pass, as a thing prophesied," for there always lies athwart it, the strange phantom of the moment of actuality, barring the easy passage of thought, since it is wholly foreign in kind. This moment is the unknown, which shadows, as it were, every foreseen stage of the coming process. Hence, the experience of novelty which seems the peculiar prerogative of finite mind in a movement which for it is history. Bradley's

view, of course, does not allow this experience unassimilable with thought, to interfere with a systematic interpretation, and hence for him the gaze up the stream already traversed is of the same logical nature as that down the stream still to be passed. The significance of novelty as an experience belonging to the limitation of consciousness cannot be recognized in philosophies for which time is unreal. History reveals value through a temporal process, necessarily bringing forth novelty because of its incompleteness. Now it is important to note that novelty is not a negative, but a highly positive, experience, in the quality of value it brings with it. The wonder experienced in the face of novelty, means the discovery of a quality in events (and an experience correlated with this quality), which is not *implied*. In history, there is no implication in the logical sense. Conversely, the arrival of novelty in the course of events essentially characteristic as it is of historic happenings, signifies the shock of thought confronting an incomplete world, the discovery that the sum of experience may increase. For a philosophy which assumes the priority of mind, this is a paradox. It is well illustrated in the history of logic, the ever-renewed attempts to bring the form of propositions of experience into subordination to that of the *a priori* or necessary propositions. The conviction that experience must be capable of organization in accordance with the requirements of thought, and relations of matter of fact show that they are dependent on relations of ideas, cannot be illusion. No demonstration, whether by Bergson, or the Pragmatists, or some modern philosophies of science that the schemata of the intellect have a merely relative value, can destroy the feeling that the welcome with which our consciousness greets them, as though they were accredited messengers from its native land, speaking its own language, proves them to have some more universal significance than our experience can confirm. If our experience cannot completely justify this,

it is because our thought is the thought of minds which are finite, and working with an alien material. Under these limitations, the activity of mind is primarily shown in memory, and the novel or unknown in experience falls into some order as entering into the universal of memory. The thesis which it is sought to establish in this paper, is that through the new order thus arising there is not merely loss, but gain in the province of mind, or the worlds of experience it, so to speak, traverses.

The necessity of the experience of novelty, and the activity of memory (creative) in this new order may be illustrated if we imagine a fable in which all the process of experience meeting with a novelty which seems to come from the external could be completed, and we could find ourselves at the world's temporal end. It is supposed that we possess as memory all reality as it has been for our form of consciousness, and endeavour to sum it up logically. The distinction of analytic and synthetic judgments might be overcome, if there were present at our council representatives of every possible point of view in all that had been. We should know perhaps the "sufficient reason" for every event and the Law of Sufficient Reason would take its equal place beside the Laws of Thought, no more an interloper. In relation to such a fancy picture designed as an impossible abstraction, I may again exemplify my view if I say that such a logical consummation is not really conceivable for minds continuing finite, even if the shock of present actuality can be assumed to have ceased. For the quality of the experience of novelty seems inherent in our conscious activity; and whatever would be surveyed, though it be all past and realized as memory, would pass into new forms as we survey it.

It is the "future" which expresses best this category or quality of novelty, and it has therefore a different status from the past, though novelty may appear in any part of our experience.

I think that this different status is recognized in Dr. Broad's view of the quality of pastness.*

In regard to the actual facts of the experience of memory. I find myself in agreement with much that is said by Professor Alexander, *e.g.*, "In precisely the same sense as I am aware of a perceived object when I have before me a sensory experience, I have a memory when I have before me an experience of the past and appropriate it to my personality." And "The imagination which I have in remembering myself is not enjoyed as present but as past. Its enjoyment has pastness written on its forehead."†

There appears then to be a certain amount of philosophical support for the view that our experience or memory of the past is direct. I have indicated the grounds of my dissent from Bradley's different theory. There is also support in psychology for the contention that the major part of that which we call present actuality, or event, is remembered, or contributed by memory. The differentia of the "present" so assertive in its uniqueness, so powerful and yet so elusive, I take to be at least, in part, the experience of the meeting of consciousness with alien material, which in the very encounter it begins to transmute. What is the significance of these facts. My world is already memory, the distant object of memory *is*, here and now, my possession?

Creative Memory, Present Actuality and History.

The view has been indicated that mind involved in a historic process must live primarily as memory. For being in its nature a

* *The Mind and Its Place in Nature.* I am unable to consult the passage as I write.

† *Space, Time, and Deity.* Book I. Chapter IV. Mental Space—Time.

universal principle it is here subject to the condition of occurrence in a process in which it is as it were broken up, until in new ways it finds a new type of unity. Now the first method of escape from this limitation is the way of memory. In analogy with the Platonic definition of time, I might describe memory as the moving image of an eternal act of mind. It endeavours to inform a ceaselessly changing movement, with the spirit of that universal and abiding principle from which as mind it draws its being. Or perhaps it should rather be said that the individual consciousness remembering is the image of mind universal in its eternal act of knowledge. The term creative memory would serve in some respects better to give my meaning if it is not taken to suggest a mere modification of imagination, or imagination itself under another name. As already noticed, creative imagination would seem to lack what is in my view the vital differentia of the activity which weaves the material of our experienced world, out of its raw elements. It would be without these raw elements *i.e.*, in no way tied to the event. Certainly through the activity I have called memory the event receives the whole of its meaning, yet it receives this under limitations, not freely, because as existent the event has something impervious to meaning, not to be moulded by its soul. Memory is a special form taken by the creative activity of mind under the condition of contact with the changing material of event. Mind, as suggested, tends necessarily to absorb this matter into its world in the form of memory. The action and reaction between event and memory, memory and fresh event produces history, and history is again absorbed by memory. If I may speak in metaphors-- the present actuality passes up the ladder of memory into a glory it had not before. And thus changed passes down again to meet further actuality trailing clouds with it, not always of glory, but always of meaning, always at least bringing so much meaning as makes possible the functioning through it of the principle of personality, which

at the lowest point creates out of bare "alteration of existence" * something in which history breathes. Or otherwise, practice is not something foreign to the creative activity of mind, as memory, since its meaning is entirely given by the conscious remembering agent. In appealing to memory, it is appealing if not to the mother who gave it birth—to the godmother who endowed it with those gifts, without which its comedy and tragedy would not have developed out of the unmeaning processes of animal behaviour.

Memory, considered as the fundamental activity of finite mind, is partly conditioned by an "other" as matter of event, the contact with which is the experience of present actuality. The bare event in present actuality is not yet historic, but undergoes, as it were, a process of development into history through the dialectic of mind as memory, bringing it nearer to completeness as a mind event, namely, through finite experience in a sequence of change. There is, if I may borrow the Hegelian idea employed as instrument by F. H. Bradley, in a very different connexion, a self-development of the event as what may be termed first history through the peculiar experience of the personal principle, for finite mind in practice becomes personal. The development is from the original condition of the mere changing phenomenon, the happening fact, the character of bare event, which is, in one aspect, nothing for thought, into the completer being of history. This more complete "second history" is, as I shall urge, the matrix of all reality for minds such as ours—the indispensable artisan of value, the event or system of events in which the values are found, from which they emerge in ever-new and unique forms, though we must classify them under a few leading types.

* See F. H. Bradley's definition of practice—*Essays on Truth and Reality, Truth and Practice*.

History thus becomes fully charged with all the meaning which memory can give it. It exists only for persons or beings for whom the changes in existence, blind events in themselves, have gained a thousand eyes, through memory, bearing its torches of value.

It may be asked at this stage would not the activity I am conceiving be better described or understood if likened to Plato's *ἀνάμνησις*?* Must I not have, in my thoughts, some notion of a faculty which contributes not only to data of present actuality, but to all data of experience, whether sense or memory images in the ordinary sense all that gives them meaning and reality? I should be glad to adopt the word *anamnesis*, but it might be a misappropriation—for Plato, whether his reminiscence doctrine be a parable or not, is only concerned with the direct problem of knowledge, and not with the prior problem of the transformation of a process of meaningless happenings into a world which is history. The self-development of the event, as I think of it, is the dialectic not precisely of the universal, making out of the inchoate experience a system at each stage more adequate to knowledge, but more fundamentally a development of the principle which some would call spiritual, working in events towards the genesis of an experience which can be correlated with mind in persons. In some respects this notion has an affinity with the Platonic view of life and thought which it has not with the Hegelian. But this is possibly only because of the greater elasticity and potentiality of Platonism, which tempts us to ask it to shelter lines of thought it might have rejected.

If the question I have in mind be put in the form, "What is it that makes history possible?" I should reply—Creative

* A comparison which would aid me in distinguishing my view of memory from M. Bergson's. See *ante*, page 297.

memory, the form of mind in finite centres makes history out of the material of events. And this making involves a greater innovation in the life of mind than Kant's construction of nature by mind. For through the categories as functions of the unity of apperception alone, it does not appear intelligible how a world of experience would be constructed of the character in which all may take on, meaning in the fullest sense all may be amenable, as it were, to the requirements of a life of value. It may help to make clear in what way I am asking you to conceive the emergence of this world if I suggest a myth concerning the entry of consciousness into relation with a process previously lacking it.

Let us assume the idea of a world originally independent of consciousness, going on its own way in accordance with a nature unknowable to us—as we might conceive one of Spinoza's "Infinite Attributes." At certain points let us suppose this world moving into contact with consciousness, as though stirred by a desire to be known, to awake from the sleep in which it is nothing for mind. It seems evident that that which thus would enter into mind-experience as something for perception, knowledge and scene for action, would be but a very fragmentary unsystematic extract of the reality. It would be the footsteps, as it were, of a being which brushes over or past us, or rudely shocks us at points here and there, stimulating that unique sense of present experience or existence which is for us immediacy, actuality. Hence the chaotic character often attending our experience of actuality. The other existence which thus would affect consciousness would not be in itself therefore chaotic. Also, it might be in its own kind or aspect, non-material.

But being another aspect of reality its meeting with our kind, or nature, must give rise to an experience of strangeness—resistance. It is in a form of contact thus suggested in a parable, that we have the basis of history in the primary or first sense.

Mind does not require experience as history for knowledge in its own nature, its own aspect of reality. But from the two conditions—first of finitude, secondly of meeting in its finite form with this other kind of being which is not wholly capable of absorption as knowledge, there results that struggle to relate the element of otherness, endless irrelevance to the unity of mind, which is the basis of the value of truth. The value here, as in all forms of value arises in the strain to overcome finitude.

It seems strange that, in spite of the cumulative evidence of the fragmentary character of our experience of being as an "other," for our nature, the story written in every one of our organs, or instruments of knowledge, that they can touch but the fringe of that aspect of things with which they are concerned, and the obvious implication of innumerable unknown aspects, for the apprehension of which our instruments are not adequate, philosophers should marvel at the "hybrid" character of history.* Also that they should treat this character, not as something of positive import for our experience, but as something to be left behind, and overcome, or resolved into a higher form of experience in which all that is valuable in it is by hypothesis retained, since in the logical activity of consciousness we are nearer to the nature of things. Value (according to the argument of this paper) does not arise out of the universal alone.

The beginnings of history are in that encounter in which consciousness is involved with the unknown factors occurring in the stream of change. From this to history proper, the transition is through the development of the kind of being which belongs to this form of experience—viz., the principle of personality, and its endeavour to persist in its own type of life. On this endeavour, value experience attends. Hence the significance of

what I have termed second history. Second history brings with it a new source of order, the type which is necessary to the practical experience, for this makes possible the partial realization of value.

If the chief subject of this paper were the theory of value, there ought to follow here some application to the actual course of history showing why the origin of disvalue together with value is inevitable, and is more intelligible on this interpretation, than on any other, notably than it is in the various attempts of idealistic monism to demonstrate that what is evil for the relative or finite view, loses that character from the absolute and universal standpoint. It would be argued that moral good and bad both arise through the struggle of the personal principle for a more universal type of being, but this struggle takes distorted forms whenever our finite experience is mainly negative and the limited consciousness has least capacity for creative activity. But this cannot be further illustrated.

The activity of memory, it has been said, first shadows forth in our mixed experience a world of universals. The mere particulars which have no internal relations to each other, are related through the art of memory in a system, which has at the lowest a degree of meaning, at the highest that deeper logic of which poets have spoken, and which consists in profoundly real relations, of which we are conscious, but which cannot be treated in systematic logic, though they are not inevitably incommunicable. My point here is that this work of memory—creative—comes first in the life of mind. It is never even from the point of view of the genesis of the human society (the view of origins in the usual sense) merely for utility, since the conditions of its presence have nothing to do with utility. It always underlies the labours of logical scientific interpretation, and co-operates or unites with these in the creation of the highest types of interpretation of existence, such as the Platonic.

One means of suggesting this truth would be afforded by the idea or principle of symbolism. Symbolism might (I think) be shown to precede both in the temporal and the logical order the systematic development of logical functioning. It may be called the work of the imaginative memory, and this, as I conceive, corresponds to the first creative activity of finite mind. The effect of this work is that something which is the mere stuff of the event, the dusty sand-heap or drift of sense phenomena has become the step to high experiences, the experience of history in its form of art (I do not say that this is the chief form of written history) and æsthetic experience of all kinds. The method of symbolism is first and last determined by creative memory. First, because the particulars or things which are symbols for any individual are so as having entered into some real experience of his personality. Last, because the complete meaning of that which is symbolized, to whatever extent it may transcend all that is particular object of perception or action, retains for each consciousness the moment of unique, incommunicable prophecy or revelation. The word prophecy here means the power of the object revealed, to interpret to the subject of the experience the course of his own inner life, a condition often attending on intense æsthetic experience.

In relation to theory of knowledge, the most remarkable fact concerning the aspect of the world as symbol and symbolized is that here the idealistic interpretation is most nearly successful. No element inevitably remains outside, for ever manifesting otherness, there is none which as symbol may not be fully absorbed into a mind-experience. This is not inconsistent with the fact, earlier noticed that dualism has its strongest source in the nature of experience as historic. What happens in experience in its symbolic character is that this shows a phase of the struggle with dualism in which the idealistic activity of mind has greatest scope. That which remains external for theoretic knowledge,

external and alien for a practical purposive scheme, does under certain conditions favouring symbolism, dissolve into a spiritual thing for a person. Perhaps Plato could only make his *ἀνάγκη* co-operate with Mind by conceiving Mind as the Divine Architect—*Δημιουργός*. Once more the strength of the positive principle which springs from the limits of finitude is illustrated.

Conclusion.

As is probably evident, the position outlined in this paper with too much brevity for the subject, though probably at too great length for the Society, is closely connected with a theory of the relation of the principle of personality, to the facts of value, though I think the view of experience as memory and history had a partly independent origin. If certain universal features of experience are given a very ambiguous position in reality, conceived as mind, the problem demands consideration—from what is the seeming absoluteness of their character derived, what account can be given of that guise of objectivity in which they present themselves?

An attempt is made to understand what is the power in human experience in virtue of which it becomes such stuff as values are made of. What, again, is the significance of the fact that events and not pure thoughts, are all in all for beings whose nature is consciousness? The course of human history, since in some sense it is an expression of mind, must have some meaning as knowledge, some significance for reality. It must make some contribution to the forms through which mind functions. In giving the general name memory or creative memory to the power that does the most important work in the building up of our essential experience as, so to speak, a new flowering of mind in the universe, I have intended to emphasize the point that it is an activity of finite mind, which is not only weakness and loss, but also a positive

force. For as activity of finite mind it colours, its material with value.

Such a position must be of a postulatory character. But beyond the arguments already given in its favour, some further general considerations may be adduced. The epistemological grounds for treating our apprehension of present actuality as very largely constituted by memory are strengthened by the recognition that present actuality is primarily of the nature of event. This strengthening takes place through the condition that the characters which come as memory, or proceed from memory, give value to the experience whatever else they give. So long as we are conceiving knowledge as knowledge of objects and a system of objects the idealistic interpretation can be subordinated or limited. But when we start from event, or a process of events, the impossibility of forgetting the difference which experience makes to the facts, seems undeniable. This I have tried to make clear, in the distinction between the bare form of the event as mere change in existence, and the event in its significance as a fact taken up into history. This way of understanding our experience shows the realist position, at least that of common sense or natural realism, to be more untenable. The event as an element of history (second history) whether it be a link in the solitary experience of an "uneventful" life, or such a happening as is called "epoch-making" in general history, is largely indifferent to its material, or body, and consisting of its soul. This is, I believe, not less true of events as occurrences in nature* in what I would call the a-scientific view, as the term non-scientific might be misleading. By this I mean the natural view of the rational stage of thought, apart from special scientific study, by which it may be modified, or supplanted, a more

* It will be obvious that I am not attempting to follow Professor Whitehead in his use of the term "event."

abstract conception taking its place. That kind of interest which is usually described as a "love of nature," is assumed, for without this the process of nature remains for the mind bare event and not yet history. It is then unreal, and has not entered into the creative work of memory.

At this point the subjective perspective standpoint threatens to emerge, and to take the argument captive. An idealism of the world as event appears to be more uncompromising than an idealism of the world of objects. Evidence for this may be found in the fact that no idealism in relation to objects has been able long to maintain itself as subjective only, but has appealed to a greater or universal mind or subject in some form, to give the degree of objectivity indispensable to the reality, which the individual consciousness contemplating things must in the end acknowledge. The world of objects for idealism must then have the support of universal mind. But for the world of events the universal consciousness is too ambiguous a support. The powerful philosophic arguments for the view of written history as constituted by the mind and experience of the historian certainly demand that the objectivity of history shall be saved by some conception of a universal principle in human development, making it conceivable that the historian should identify himself with the minds of those whose history he reveals. Such a doctrine seems to be implied by Signor Benedetto Croce. But this possibility would not be in virtue of universal categories of mind as practical, determining the character of motives and behaviour. The identification suggested would only be achieved individually through a sympathy which enables the historian to stand, as it were, in spirit at the point of view of his subject, and so enable the events to live again. The nature of actual history, as a product of points of view, inherently unique and irrecoverable, would be unaffected. The ideal (or spiritual) position of the point of view seems determined by creative memory. If memory

can conceivably be transcended by finite mind, reaching the Plotinian stage of pure *νόησις*, the perspective limitation would cease and with it history and individuality, at least such as makes our world. Is the truth of the event, then, wholly relative, involving in its relativity history the world of values, and all knowledge—since knowledge is here regarded as after history in our experience—in the order of logic, as well as of time? The consideration of this problem would take us too far. I have, on another occasion, maintained the view that the perspective standpoint in ethics does not destroy the possibility of an absolute standard, since personalism involves an absolute obligation though the moral situation is always unique for the individual, and I think this holds throughout the fields of value. As regards scientific knowledge I should argue that here at least we might *a priori* expect that the conditions of the finite situation for the personal form of consciousness have similarity enough to determine universality of categories when the historical conditions are abstracted. Scientific knowledge has thus a highly abstract character, though the general conception of experience presented in this paper tends to the conclusion that this character cannot be wholly unaffected by the historical conditions which are essential to our activity in all forms. The view, however, has already been implied that the logical forms do exhibit a character which as inherent in mind have an absolute validity.

The treatment of history itself as a science, gives us a type of knowledge which in relation to its subject-matter is doubly abstract and more remote from the reality with which it is concerned than scientific knowledge in general. This point of view is contrary to Bosanquet's judgment of history,* which clearly implies that history can only become a satisfactory and concrete form of experience by passing beyond itself into sociology, art,

etc. To bring out my divergence from this, I would refer to the sense which I think we constantly have in reading the works, even of historic genius that we are, as it were, only scratching on the surface of the reality concerned, persons and events—and know little of the meaning even in regard to the main historic movements, almost nothing of that infinite of detail factual and psychical which, as Croce says,* grows as we touch it, and which he dismisses as the “thing-in-itself” of history, but without which nevertheless (as I urge) it would not be history, for life is not a clear-cut statue, but always belongs to Plato’s mixed class of *μέγας καὶ ἄπειρον*.† Now if we are only scratching on the surface, we do not come nearer to the centre of that which history aims at knowing in its own true form of knowledge, by turning to some study of the broad phases of similarity, in certain aspects of historic happenings, in order to establish general uniformities. We are then leaving essential history for another kind of knowledge. The only key to real history is the personal activity of the historian interpreting the symbols or records and other data through his own creative memory, and whether his type of genius holds the key that unlocks will always be a matter of speculation.

In history and art in all its forms we have kinds of knowledge only conceivable through finite experience in change, the particular kind of change, in reaction from which mind shows itself as creative memory, for in history also there is creation, and in art universally there is memory. The one universal character of all genuine artistic experience, otherwise unique in each form, and again in each instance of the experience, is that it represents the purest attempts of the mind to pass beyond its limits, and perceive the world or any fragment of it freed from finitude, in relation to the artist or to the subject of the experience. Hence

* *Theory and History of Historiography*. Parts I-III. *Universal History*, translated by Douglas Ainslie.

† τὸ μέγαν in the *Philebus*.

proceed all the other typical qualities diversely ascribed to art, and the artistic experience—the type of peace, as port after storm, the type of stress, as hunger for the infinite, the type of purification as sloughing off the elements that impede the flight to the eternal, the type of pity and terror as the union of greatness and insignificance, in ephemeral man, the type of intuition and expression as abstraction of an impalpable vanishing vision, from the grossly palpable, ever-present need.

It is then an experience such as ours which makes art possible. Its nature proclaims it the product of creative memory, having a setting therefore in history.

The values of art and history are not colours of a spectrum, whose truth is white light, nor fallings and vanishings of an absolute experience. They are something novel in the eternal day of mind, only possible in worlds which have their sunsets, nights, and sunrises which do not pass into perfect day. Their beauty may appear in another form in other worlds, but it is another form, and the proposition that they are one-sided aspects which transcend themselves,* does not seem to have significance as a value proposition.

* Cf. *Appearance and Reality*. F. H. Bradley. Chapter XXVI. The Absolute and its Appearances.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on May 23rd, 1927, at 8 p.m.*

XIII—THE CLAIMS OF COMMONSENSE.

By M. C. D'ARCY.

THE word commonsense is, I fear, a *bête noire* of philosophers, partly because it is used and quoted to defy their theories, and partly because it is very difficult to find any clear or precise meaning in its usage. I do not propose here to rely on its original meaning, or trace its history, nor even to attempt an exact definition of it. This, however, it is necessary to state to avoid misunderstandings— that I do not mean by it what may be called horse-sense, nor is it to be confined to sense knowledge, still less to public opinion. The word is chosen as convenient to express and cover certain activities of mind and their content, which can, I think, legitimately be put under one category. By sense is understood what comes by way of experience. Experience, however, is also a vague word, and so I mean by it and sense what can be classed under perception, direct knowledge and judgment; all, in fact, that is opposed to speculation or reflective thought. I should add that in the use of these terms so far, no particular theory is insinuated; they are words of everyday use, and are intended to be taken according to that use.

The adjective “common” limits the kind of “knowledge” contained under “sense,” and again it is useful as excluding the ephemeral, the conventional, the technical, and the trivial. There is a common stock of knowledge which all men and women

use in the ordinary concerns of life gained from the primitive and inevitable experiences which every human being must undergo. This common experience is found in language, and used in literature and conversation, and presupposed and added to in the conduct of art and commerce. Were there no such commonwealth of meanings, language could never have become the easy means of communication that it is, and we should be perpetually in a worse plight than the builders of the Tower of Babel. When we are puzzled, as to-day, by certain modern writers of a new prose or Futuristic art, the cause is a conflict of a new set of meanings created by a theory with the old and established, and the latter will win the day unless the new can rid itself of the esoteric and show itself a legitimate development of what is sound in tradition.

Commonsense, therefore, as used in this paper refers to that body of knowledge which is more or less permanent, gained by man in contact with life through experience. If I call it universal I do not mean to imply that I am resting its validity on universal assent. *Securus judicat orbis terrarum* may be a fair ground of argument, but here it is not to the purpose save in so far as a general agreement about the validity of an experience might imply that the experience in each particular case must have carried with it strong evidence for its truth. The claim then for commonsense is really a claim for truth in much that is direct, as opposed to reflective or philosophic knowledge.

Now the question so raised between the claims of commonsense and philosophy is an important one, for if we decide for commonsense then a question mark must be put after much that goes at present as sound in philosophy. Prof. Whitehead has summoned the scientists to answer for the cleavage they have made without misgiving between the world we live in and the world of their abstractions; and his demand that part

of a true education "should be intuition without an analytical divorce from the total environment," with the addition "that there is no substitute for the direct perception of the concrete achievement of a thing in its actuality," has its bearing on commonsense as I have described it, and its relation to reflective thinking. For may it not be that philosophy has suffered from a similar fault to that of science, in ignoring what is given by direct "knowledge"? Instead of recognising truth in what is given before reflection, it has by a very human weakness usurped all authority and made itself into a *roi fainéant*. How else can we account for the gulf that separates us as human beings and as philosophers, the gulf again between the conceptions that men live by, which are to be found in literature, education, practical ethics and politics, and the theories in the volumes of philosophy, and, lastly, the mistrust of the philosopher which is so widespread and perennial?

Philosophers, I know, will have their answers ready, each varying according to his theory, but to judge from the past and the present as well, they will either do scant homage to metaphysics, or they will exalt metaphysics on the plea that experience or the wisdom of commonsense is a very inferior kind of knowledge to be corrected or sublimated. It might be objected that neither is very satisfactory; if metaphysics is taboo, then a critical examination of the nature of knowledge should not be permitted. Those, for instance, who reduce direct acquaintance with objects to a bare awareness (where the word "bare" implies that the special relation set up by knowing can be ignored) have no right to write a philosophy, because the activity of mind involved in so doing is very different from that bare awareness. Nevertheless, they generally proceed to do so. On the other hand, if what I have called metaphysic is the province *par excellence* of truth, it is hard to see what an inferior kind of

truth can mean. No doubt, the phrase helps to save its makers from the awkward predicament of denying the possibility of attaining truth below the metaphysical, or again, of admitting it unreservedly. Both positions are doomed. If there is no truth before reflection comes in, before a Critical Philosophy has had its say, then on what grounds can reflection or criticism claim to possess truth? As has been remarked, it is the same mind which works on weekdays as on Sundays, and if the value of the work of the six days cannot be guaranteed as sound, how can the Sabbath reflection be in better plight? If now we restore the guarantee of truth to the mind in its daily occupations, the reflection on the Sabbath becomes superfluous, and the day truly one of rest. There is an obvious reason, therefore, for searching for some intermediary between the two mental activities, and though I do not assert that this is the sole explanation, the distinction between degrees of truth is very convenient. Moreover, it meets a curious inclination to prefer reflection to direct apprehension, the complicated to the simple, the demonstrated to the obvious and self-evident. But the inclination, while intelligible, because it safeguards us against hastiness in judgment, has no justification when we judge truly. Once we know a statement to be true, there is an end, and reflection cannot add anything to its truth.

The function, therefore, of a Critique must be sought elsewhere, and I think that many might explain the relation of what I have called commonsense, or experience, in the wide sense I have explained, to philosophy proper, by admitting that there may be truth in the first, but certainly not always, and that it is part of the function of reflection to separate the gold from the dross and so form a system of truth. I should have no quarrel with this explanation were its defenders without any concealed or unconscious prejudice against commonsense. In fact, however,

behind this vague agreement I fancy that there lurks considerable diversity, or at least a difference of emphasis. Many views are influenced by theories which, though dead, yet exert an influence, bequeathing assumptions, ways of thinking and modes of expression. For instance, even though the word "phenomenal," as used by Kant, belongs to a theory which is perhaps discarded, the taint of the word subsists, and, consequently, we may pass lightly over experience as not putting us into touch with the thing in itself. Similarly, with sense-data, or the association of the word commonsense itself with Reid's interpretation of it; an interpretation which, in many places of his writing, connected it with instinct instead of reason.

And yet if we forgot theories and arguments for a moment, we should uphold the claims of commonsense, for whether we be writing letters or talking, or thinking, we are using words with a meaning, and we should blush to be told we did not know what we meant. Certainly our everyday life is made up of opinions, beliefs, prejudices, and certainty may be rare, but imbedded in the beliefs are meanings about which we have no doubt. Now meanings attach to objects, and so it would appear that we do have knowledge of objects. So deep is this conviction that the unsophisticated would, if asked, be sure to say that they had a certain knowledge of reality, that language with its distinctions of noun and adjective, its verbs active and passive, and other parts of speech, express the nature of the world we live in. And this conviction finds its place in the tradition of philosophy which descends from Aristotle. In this tradition, the function of mind is to apprehend reality as such; knowledge is of the real, of being or what is. Thought in distinction from sensation is at home with natures or essences — *perambulat essentialia*, and hence, in its ordinary transactions, the intellect is telling us something about what a thing really is. Now this may sound very obvious,

but the consequences are so serious, and so often ignored, that it requires restatement. If the intellect is the faculty of truth, and if truth is the apprehension or statement of what a thing or being is, then, as our intellect is never idle, we are constantly in the realm of truth, and the problem of commonsense is not whether it is ever right, but when and where it is wrong. Truth is the normal, and not the accidental, and so the whole emphasis in dealing with the question of commonsense is changed.

We should expect then to find far more in the declarations of commonsense than may have been hitherto suspected; for instance, that in understanding what we mean we have already arrived at the goal of truth, or at any rate established what cannot possibly afterwards be pulled down. And here speech and grammar should prove very illuminating. To take some examples:—The distinctions between various attitudes of mind, ranging from surmise through probability to strict knowledge, imply that we know what knowledge is, and that the approximations to it presuppose it, and are also fully intelligible in themselves. We cannot know without being aware of it, and, if this is so, a reflection on knowledge does not carry us any further in the one essential of its nature or validity, whatever else it may do. Being relieved, therefore, of a philosophy of knowledge in this regard, if we have to call to our aid a *Critique of Reason* or an *Epistemology*, we shall have to do so on some other grounds, and, furthermore, since knowledge is its own judge and appraiser, we may find it in operation in many of the dicta of commonsense. Now, in many of the meanings we use in everyday speech, we should, I think, be prepared to swear we knew what we meant until we became confused by the philosophers with their affirmations and denials and their theories. No one, for example, hesitates over the meaning of truth till he becomes a philosopher, and the question becomes a difficult one because this theory or

that has been invented to explain it, and usually fails to do so; because the explanation generally, if not inevitably, consists in the reassertion of a simple notion *sui generis*, in terms of something else. Here the reflective mind is the villain of the piece, and I think that no one can deny that the history of philosophy is strewn with theories which, by treating a conception or object as what it is not, have made it more difficult for succeeding generations to use any word without ambiguity. (For this reason I might add incidentally that the putting of the question, What do you mean by truth, may be either pertinent or foolish, according as the person asked seems to be assuming a special theory of truth or not.) When we examine commonsense, we find, time and time again, that words have lost their simple and original meaning because theories have twisted them out of recognition, and the old sufficiently defined landmarks become as confused as the battlefields of Flanders. All words that end in "ism" are rightly suspect, and the most common words have to be watched sedulously, because their obvious meaning has been subverted. As the late Professor Cook Wilson wrote, "The fact is that a philosophical distinction is, *prima facie*, more likely to be wrong than what is called a popular one, because it is based on a philosophical theory which may be wrong in its ultimate principles. This is so far from being appreciated that the reverse opinion is held, and there is a tendency to regard the linguistic distinction as less trustworthy because it is popular, and not due to reflective thought. The truth is the other way. Reflective thought tends to be too abstract, while the experience which has developed the popular distinctions recorded in language is always in contact with the particular facts. Now, it is not uncommon that some usual term, when reflected upon, presents great difficulties to the philosopher, difficulties, it may be said, which are due to some false theory of his which is presupposed.

The criticism sometimes ends in pronouncing that reality only means what is intended by some other term, so that in a manner it is explained away ; and thus a distinctive use of it is supposed to be a mistake, or even the meaning of the term may be pronounced as altogether an illusion." The same writer gives, in another place, an excellent example of the working of the mind when free from philosophic prejudice, and the intrusion into its language of a technical word, in an analysis of "idea." He argues with considerable force that normal thinking does not lead us into puzzles about intermediaries in knowledge between the object and the mind ; there is no confusion between the content of our knowledge and phantasm or images ; there is no sharp distinction between appearance and reality. But the word "idea" comes like a wolf into the fold, being historically connected with a theory which commonsense knows nothing about and so the evil starts.

The same pernicious interference, it may be urged, can be seen in many other examples, and the result would be to give us greater confidence in our unsophisticated conceptions. Here, however, to prevent exaggeration, a distinction is required. I have said that the average man is under the impression that he knows what he is talking about, that his language is of reality, and that its distinctions are founded on that reality. In certain cases he would have no hesitation in saying that he understood fully, in others that he understood correctly and summarily but not adequately. This distinction is important because it gives full play to the claims of commonsense and yet leaves room for a philosophy. Knowledge itself is the best example of the first category. A man in knowing must understand completely what he is doing ; otherwise never will he gain a foothold. Besides, all the other attitudes of mind have significance only if knowledge is already understood ; and this implies that the word "thinking" is fully evident. The same, I suggest, may be said of equality

and inequality, of relation, existence, presence, and so forth. I hesitate to give other examples for fear of being provocative, and so preventing a possible agreement in principle by conflict about detail. For the purpose in view, conceptions which might belong to the first category, can be assigned to the second. The conceptions which belonged to the latter were described as understood correctly and summarily but not adequately. This description will appear less vague if we recall what was said of the mind—that it was the activity whose sphere was reality as it is. In the first contact with reality by experience, whether in perception, observation or judgment, we apprehend being, substantive, adjectival or relational, and I would suggest that this direct apprehension is of more importance than is usually recognized— for, so to speak, it secures a grip on the real. It is of its very nature more likely to be correct, though inadequate, than incorrect; that is, as I have said, success is the normal, and failure the abnormal, which needs explanation. Our first apprehensions are of a general character, they catch hold of an object wholly before proceeding to consider aspects of it; that is, as I have said, they know it as a form of being. Unfortunately, the subsequent proceedings of the scientists, who quite justifiably abstract from the object in the plenitude of its being to examine it, for example, in so far as it is measurable—tend to make the philosopher forget the Humpty Dumpty on the wall in his interest in the pieces. And so he attempts a restoration out of a selected piece; and if over-confident, calls his new monstrosity the *real* Humpty Dumpty, or, in despair, declares that there never was such a being. Here the philosopher has surrendered completely to the scientist, and has forgotten that he is far more akin to the commonsense man in that both deal with reality integrally—the one with its most striking characteristic, the other with the complete characterization and essence.

Perhaps the worst example ready to hand of this failure to appreciate the "given" and the consequent sham reconstruction out of the pieces of abstraction is Behaviourism. As a working hypothesis it may be legitimate to treat the whole, which is conscious life, under the aspect of behaviour. For this purpose there will be no need for "reference to such terms as sensation, perception, attention, will, image, and the like." But when this scientific procedure is exalted into a philosophy and thinking is defined as "subvocal talking" and nothing else, and all the activities of consciousness are resolved into the reaction of the body to stimuli, then the vice which I have denounced is apparent, and the indelible meaning of consciousness and its activities given in commonsense and reflective thinking has been simply disregarded. The extreme position of Behaviourism is instructive, because it provides such an obvious example of the bad habits of philosophers which might not be so apparent in other theories. But I suggest that the same error is present in a more disguised form in many of the theories prevalent at the present day. Instead of psychologists admitting the data of developed consciousness as present from the beginning in embryo, the *totum sed non totaliter*, we find them tracing their genesis out of something quite indeterminate—or, at any rate, radically different from the resultant known. Time and space are evolved out of what was not originally given; and the object or thing with its appearances is reconstructed out of the pieces of sense-data. This reconstruction breaks down continually, but philosophers will not learn the lesson clear to commonsense from the start—that the real world is not a combination of sense-data, but a collection or constitution of subjects with attributes.

This neglect of the subject has been rectified to some extent with regard to the self or soul because of the scandal increasingly felt in leaving it out. Yet the history of its restoration provides

an excellent confirmation of the thesis in this paper. We see first a neglect of the information contributed by commonsense, and in the interest of a theory the self is reduced to a succession of impressions bound together somehow by association. This view, prevalent for some time, so failed to answer what was meant by self and to meet the facts, that a stream of consciousness was introduced as an amendment. But the stream was again found insufficient because the self was left out and the unity persisting despite periods of unconsciousness had not been explained. Hence, a more modern tendency to revive "animism" and reinsert an entelechy, though the movement has not yet turned full circle. Scarcely less illuminating are the vicissitudes in the explanation of memory. One might have supposed that the meaning of memory would be clear, and the unsophisticated would be surprised to be told that he did not understand what he was continually exercising and speaking about; but he would be still more surprised to find explanations which, if true, would entail that the past is revived as present, seeing that the essential characteristic of memory is a thinking of an event as past.

What comes out in these examples is that common sense is justified in clinging to its conceptions. The philosophic theory has in each case neglected its findings and suffered a reverse. These conceptions are, as I have suggested, of the real; they tell us what a being is correctly if inadequately. Further illustrations would, I think, confirm this result, and I may suggest a few without entering into a detailed examination of them. The habit, for instance, of translating the objects of perception, such as colour into vibrations, and leaving out colour or, what is perhaps even worse, talking about the brain being coloured, contravenes the meaning both of perception and colour, for try as one will one can never see vibrations, and there is something which is seen. Let, again, a theory dispose of causation, discard

consciousness and a subject as not required, and after reducing reality to a changeless world where we are left with just a probability that events of a certain kind may follow events of another kind, substitute mnemonic causation, perspective and belief-feeling ; on the principles suggested in this paper the criticism would be the same ; reality has already been rightly apprehended and the theory is an evisceration. Causality has a meaning which cannot be reduced to something else, and probability involves knowledge, while the attempt to reconstruct reality without a consciousness or a subject lands one in the Humpty Dumpty predicament.

Extending still further this kind of knowledge, which is correct if inadequate, may we not apply it even to such distinctions as matter and mind, inanimate and animate, and with more assurance to the provinces of ethics and æsthetics. These latter serve perhaps best of all to bring out the nature of our conceptions, the conceptions of commonsense, as I have called them. All of us act as if we had a fair if inadequate idea of what is good and what is evil. We might be mistaken in certain particular cases, but even then we should correct our mistake in the light of what we knew, so that somehow the meaning of good appears already in our possession. Similarly, with the virtues and the vices. Plato, as we know, opens his Republic dramatically with the figure of the old man Cephalus, who, though incapable of a philosophic justification of his actions, practises justice ; and the suggestion given is that a theory of justice must be in accord with the "common sense" of the old man. As a matter of fact, in the Republic, as in all sound treatises on the virtues, the theory is not only in accord with this commonsense, but is tested by it. Our theory of justice or bravery or love is confirmed or upset by its ability to meet what we are certain is justice or bravery or love in individual cases ; so that in a sense we must be already

aware of what these virtues are. Now, if this be so, we have an excellent example of the truth of the assertion that normally we know reality at once ; roughly, perhaps, as a rude sketch, but so accurately that the details or the articulation must be in accord with the first vision.

A further confirmation of this would come from an analysis of the actual process whereby we pass from uncertainty to certainty. It is a curious fact that this process usually takes the form of asking ourselves what exactly we mean or must mean when we are thinking. We think we have arrived at the truth, and then find that it is not exactly what we had in mind ; we proceed, as I said, by measuring the theory against what we, somehow, know already but cannot express adequately. As a contemporary philosopher has put it : " In growth of thought man broods and picks out what he seeks ; the consciousness of the general nature of what he seeks somehow controls the movement of thought wherein detail suggests itself." And again : " In the growth of mind we cannot refuse to admit that what comes to be is what was imperfectly before. And as ' the passionate thought ' directs the mind in study or the vague, though passionate thought of the complete work of art directs it in designing, so it seems as if the mind helped to direct the process by which it is developed."

We can now sum up all that has been said so far. Commonsense in the sense used in this paper of that wealth of information belonging to man as man deserves far greater respect than it usually receives at the hands of philosophers. Being the outcome of experience and tradition, it is often a safeguard against the reconstruction of the universe in a philosophic theory. But, further, it has at times just as much claim to truth as any statement of metaphysic, because the word " sense " here does not exclude the activity of the mind, and, in fact, the mind is

intimately involved, being engaged on its proper work of seeking and finding the nature of what is. As, however, it is unreflective, we can distinguish three classes of objects with which it is concerned. The first are those which yield their meaning completely; and here we have knowledge strictly so-called. In the second class the general nature of objects with their differences from others is seized, but there is given only a sketch or summary, the details of which have to be filled in later. And into the third class falls the vast number of objects whose nature is at first more or less indeterminate, so that men have to wait on time, experiment and reflection before they can come to any certain conclusion.

It remains now to consider what change this view of commonsense demands in the outlook of philosophers. First, as suggested in the beginning, in certain camps a change of front is required, and, in general, a high regard for the convictions of commonsense must be preserved. This regard will show itself in a deeper appreciation of language and the distinctions in it. These distinctions arising through the pressure of reality in experience, save the philosopher from his besetting sin of reducing the irreducible in his desire to systematize and form a unified conception of reality.

Secondly, since it is normal for commonsense to be right, it were better when it is wrong to examine the reasons of the error than to treat its data in a cavalier fashion with occasional returns to courtesy. A great benefit would be conferred on the philosophic community if definite canons could be drawn up directing us to the chief sources of error, such as the contamination of judgment by prejudice, the tendency to treat the negative as something positive, and the immaterial as possessed of sensible properties. This latter is, perhaps, the most prolific of error, as we cannot help imaging and imagining the immaterial, in sensible

form, and anthropomorphism is for ever getting in the way of a proper conception of the ideal and the divine. It must be confessed, however, that one almost equally fruitful source is the *damnosa hereditas* of bad philosophy. The evil that it does lives after, passing into common language and common thought, and so confusing simple conceptions that even the wise begin to wonder whether they know what, for example, duty or knowledge or reality mean.

Thirdly, a vindication of commonsense does not lessen the value of philosophy. In this paper I have reserved the name philosophy for the more reflective operations of the mind, for the theories which are built upon the data of the less reflective consciousness, and for the explanation of them *per ultimas causas*. It might be urged against this distinction that throughout this paper I have been playing the philosopher, inasmuch as the justification made out rested on reflection. To save ambiguity, perhaps the word analysis might be used in contradistinction to synthesis. Of course, an analysis has to be made both of what we mean and of the truth contained in what we mean, but this, if part of a philosophy, is separate from the other member, which would involve the construction of a system.

But the more serious objection is that the glory of philosophy, namely, system-making, is taken away from it, and in its place we are to have nothing but a checking and docketing of the data of commonsense; and even this occupation has been converted into a mere formality by the cry beforehand that all is well. To this the answer is that philosophy suffers not a whit, that there is nothing obscurantist in the plea for a fair trial for the convictions and judgments which we hold so firmly when we forget our philosophy, and that there is no pre-judging of the case before it comes into court. It would be quite a mistake to think that a favourable attitude to the suit of commonsense means less and

not more thought. The analysis of what we mean persistently practised is a heavy if salutary labour of thought, and the close attention to the infinite shades of meaning in the world of our consciousness, as well as in the infinitely rich variety of the external world, spells gain to us and not loss. There is, too, no formula or prescription which will save us the labour of continually examining the content of our thought. This labour may not be congenial to the lover of synthesis ever bent on discovering or inventing a new philosophy. There will always be, I suppose, some discord between two types of philosophers, between those who are content to dig and examine foundations and those who build castles—often in the air. The analyst is sceptical of these synthetic philosophies: while his opponent is impatient of this stay-at-home policy, being eager himself to reach an Eldorado. There is no reason in the nature of things why both should not work together, and the difference is one of taste and not of reason, and taste should not enter in when it is a question of truth. Truth should be the sole dictator, and it is wrong to sneer at commonsense because its light is very dry and its findings apparently trivial. As a matter of fact, the truth in commonsense is by no means trivial or sober, for as Plato and Augustine saw, the truth is always there present to us, ancient and ever fresh, and it is "our estranged faces that miss the many-splendoured thing." After all, there is nothing undignified in vindicating one's hearth and home-territory instead of wandering to join far-off causes; nor, again, in maintaining a common humanity and common fund of truth with the men and women who appear in the literatures of Greece and Rome and the Middle Ages.

To prevent misunderstanding, it may be well to add another paragraph in conclusion. Fight as they may with one another there is no serious reason why the defender of commonsense, the analyst and the synthetic philosopher should not work together

amicably--in fact, it is necessary that they should do so if a theory is to deserve the name philosophic. There is, I believe, room for a critique of knowledge, even though the meaning and validity of knowledge be understood fully in the very act of knowing. But, apart from this vexed question there is certainly room for a metaphysic, no matter what value we assign to the judgments of commonsense, and even to a philosophy which approximates to the mystic in its delicacy of apprehension and anticipation of the possibilities of intuition. If the number of fixed stars in the firmament of commonsense be greater than was supposed, that only means that the system co-ordinating them will be closer to truth and more vast in its embrace. The philosopher is still at liberty to search for the inter-relation of the data, their causes and grounds, seeking to penetrate to the ultimate causes and see all dialectically or synoptically. How one should set about this unity, on what principles and with what results, it is outside the scope of this paper to inquire. But, clearly, the closer the inter-relation of the data, the less artificial it is, the more it allows for the rich variety of reality, the nearer will it be to full comprehension. Perhaps the ideal is impossible of complete attainment because the universe transcends man's limited capacities; and, just as a critic of a supreme artist grasps but partially the significance of his work, and returns again and again to find new detail and new meanings, so, too, the theories of philosophy are incapable of rivalling the divine plan.

This does not mean that they must necessarily be false, but it does suggest that the limitation must enter in in our account of the whole of reality. Herein, as it seems to me, lies the strength of the Aristotelian tradition. In that philosophy there is an explanation of why the human mind is pursued by failure, and yet rightly confident in its ability to know to some extent truly what the nature of reality is: why, again, the concrete individual

escapes the mesh of abstractions and yet can be appreciated to a degree by means of those abstractions, with the result that the philosophy is both faithful to commonsense, and yet, if anything, ultra-metaphysical. The whole philosophy is governed by certain principles which are not taken from any section of reality, but are components of anything which deserves the name real at all. They therefore leave each intrinsic nature intact, and allow for it, and yet provide a means of unifying our conceptions of these natures in one system. In the place then, of a unity which, by identifying the whole with one member in it must necessarily impoverish the real, we have a hierarchy of being where the principles of order, being as wide as reality itself, leave the intrinsic denominations of that reality unaffected. Moreover, in that hierarchy, the human being finds his proper place, not at the top, nor at the bottom: neither pure spirit nor pure matter, but a half-way house between the two: a mind which can grow only by its contact with matter, and a matter which is a fit instrument for the mind.

I choose this example of a metaphysic, not for the purpose of defending it in this paper, but in order to give an illustration of how commonsense and a metaphysic may go hand in hand, and how a system may fail to exhaust reality and yet remain true, giving us a synthetic vision, and at the same time a philosophy of failure. This value, I claim, attaches to the system, even if the system itself fails to recommend itself to modern minds. But whatever system be adopted, it must certainly be fully alive to the differences which make up the complex world we know, and avoid those generalizations which conceal more than they reveal, keeping, so to say, in the sun and away from the night, in which all cows are black. When philosophers, for instance, explain laughter to us by telling us that we laugh at the incongruous, they forget that they have told us little or

nothing, for we do not laugh at all that is incongruous, but only at comic incongruities. When duty is called a moral necessity or a law, the chief characteristic of duty is in danger of being left out, for it is like no other form of law, and only necessary inasmuch as it is a peculiar form of obligation. When Croce attributes freedom to every motion from that of a stone or a flower to the choices of man, the word freedom is made to cover what are radically incompatible, so that it becomes for the most part a mere metaphor; and his definition of volition, as at once necessary and free—necessary as arising from an historical situation, and free as going beyond it—is so vague as to apply to every event in nature, while it tells us nothing of the difference between the falling of a stone and the choice of a man. This subsuming of one department of reality under another is but a verbal operation: the old distinctions stick out all the while, and no one is any the wiser for it. Nature and life have taught us lessons that we cannot ignore, and the more we contemplate nature and others and ourselves without prejudice, the less shall we be prone to bring out any foot-rule of theory. Are not, for example, many of the problems connected with the self, or God, due to the prejudices and preconceptions with which we approach them! The self, if it be anything, will clearly have marked characteristics of its own separating it from all else, and it may be just its nature to be permanent and identical in and through development: a conception which, if unique, is nevertheless not self-contradictory. The same cannot be said of Gentili's conception of God as pure act and also in an eternal process of self-realisation, eternal and also successive. Where a subject is not already a pure act, we can see, I think, meaning in a combination of change and permanence, but when all imperfection and potency are removed, how can there coexist plenitude and growth? The thing seems, once again, to fail because it is

maintained in the interests of a preconceived theory. Indeed, when treating of God, philosophers are especially apt to forget what divinity implies. The conception is there rooted in tradition and language, and I suggest that if we would but admit with commonsense that we have some dim awareness of what divinity must and must not mean, many of the prevalent theories of God's nature would have to be rewritten.

These examples, then, out of many other possible ones, help to show that commonsense is not a foe of philosophy, but an ally; they show too that one of its chief services is to point the way to a true metaphysic and to warn philosophy of its principal vice. The vice written in almost every page of its history, of neglecting the multiplicity often given and of attempting to rule by a veritable massacre of innocents. By these means we win a unity at too dear a price. *Solitudinem faciunt et pacem appellant.*



*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on June 13th, 1927, at 8 P.M.*

XIV.—MENTAL ASSOCIATION.

By F. AVELING.

My apology for offering a paper to this Society on a subject so well worn as that of the Association of Ideas must be that, as characteristic mental process, its explanation will help in determining the view one should adopt as to the nature of the mind—a matter which has been conceived in such different ways by psychologists. In the historical development of the science several such explanations have been put forward, either as a groundwork upon which to build a general theory of mind or in consequence of a general theory which required empirical support. Thus the fact and the manner of the recall of past experience, because of the different concepts framed to account for them, have led on the one hand to the most pronounced spiritualist views, and on the other to the most thoroughgoing mechanistic and materialist ones. The active and spiritual Soul, at once the subject and the treasury of experiences, is confronted by Consciousness as a mere collection of impressions and ideas. The wheel from Locke to the New Realism has turned a full cycle; and both soul and mind are confronted with a world in which there is no consciousness at all. This fact would appear to suggest that some, or perhaps all of the usual explanatory concepts are inadequate; and the suggestion is strengthened by the further fact that psychologists seem to have had such great trouble in applying them.

My own contribution to the topic is a small one; but I dare to think not unimportant. In developing it I shall be obliged to review a certain amount of more or less commonplace matter; and for this I must ask your indulgence. But I shall also make use of Spearman's recently-formulated principles of noegenesis.

I propose to review the facts of recall in the light of the laws of original cognition; and I believe that some importance attaches to such a review. The fecundity of the noegenetic principles has shown itself in many directions already. I hope to show that they bear fruit here as well.

I.—PROBLEM OF ASSOCIATION.

During conscious life a continual mental activity goes on by reason of which what may be called the end-products of the various cognitive processes are in a perpetual condition of transition or change. Not only does any particular one of these end-products, considered apart from the others, rise from a minimal degree of consciousness and fall back again into obscurity; but, considered in relation to the others, there is a continual succession also between them. We may suppose that this is due to a relatively constant but limited output of mental (or other) energy; together with a specific fatigue of the several processes in question. We are not continually occupied with one conscious experience in its different phases only; but we perpetually pass from one phase to another and from one experience to another. Thus, in perception we apprehend one object after another, or pass from the contemplation of one to another aspect of the same object. So also in trains of thought about absent objects we find ourselves passing from one to another in ideal representation. It is from this latter case rather than from the former— or better, perhaps, from a combination of the two, when the thought of one object succeeds the perception of another— that the notion of an Association of Ideas has been inferred. In such trains of thought initiated by a percept or a spontaneous memory we find a certain coherence and order. This is most manifest in trains of voluntary thought consciously directed towards the attainment of some end, as the composition of a letter or the solution of a problem. In

cases like these the succeeding thoughts are observably coherent with the preceding ones. There is at least a tendency towards a logical connection between them; and some sort of a teleological order from beginning to end.

But in trains of thought not directed towards an end by the conscious desire to achieve it, a certain coherence, and even an order, is also to be discovered. In revery or day-dreaming our fancy flits from one object to another much as our mind does in trains of voluntary thought, although here in no logically consistent way. And the problem in regard to revery is to discover what nexus or link, if any, binds each succeeding thought-object to the preceding one, or in virtue of what principle the succession actually occurs; just as in the previous case the problem is to find out why the sequence of thought-objects is throughout characterized by logical coherence.

II.—FORMULATION OF LAWS.

That the percept or thought of one object, or aspect of an object, in general tends to be followed by the thought of another is a commonplace, and did not long escape reflective observation. Indeed, that there is some principle—or principles—in which this tendency can be expressed has been asserted from very early times. Plato called attention to the fact in support of his argument for immortality in the well-known and very beautiful passage in *Phædo*; and he explained the occasion of remembrance as consisting in present percepts like the experiences recalled. Though the argument begins with objects originally juxtaposed in sensory experience—"harp, habit, or any other thing that their friends or mistresses used to make use of"—its real nerve for the purpose of his proof lies in the relation of similarity which obtains between a present conscious experience and a past one. Indeed, since the physical world of the senses could not originally have been experienced in contiguity with the

thought world of the ideas, it could hardly have been otherwise. Contiguity of experience is a reason for recall; but the other principle of Plato is not of the same order as this. Remembrance may be accounted for on the ground of past contiguity; but it may also be occasioned by an actually perceived object, together with its likeness to some past experience with which it has not necessarily been contiguously experienced. In other words, while remembrance is always effected by way of relation, there are two kinds of relation to be considered, a sensory contiguity and a conceptual resemblance.

The same facts of recall were analysed and their principles formulated by Aristotle in his *Memory and Reminiscence* under the three heads—likeness, contrast and contiguity. “When . . . we recollect we awaken certain antecedent processes and continue this until we call up that particular experience, after which the desired one is wont to appear. That is the reason why we hunt through a series in thought, beginning with an object presently before us, or with something else, or with an object that is similar or opposite, or contiguous.” While Aristotle roots his explanation in contiguity, the three principles thus stated are evidently not all of the same kind. The first and second do not require that any “association” should *have been* set up between objects of thought in past experience. In them it is stated merely that a relation of similarity or of contrast which may obtain between a present and *any* past experience can account for the voluntary recall of that experience. And for this reason these principles would seem better to be termed principles of Mental Suggestion than laws of Association. Present experience suggests to us similar and contrasted past experience. The third principle, however, is really more properly called a law of Mental Association; since by it an explanation is given of the facts on the ground of a linkage or “association” *having been* established between several objects consciously experienced

together in the past. In virtue of this linkage a present perception or thought of one of them tends to make us recall the other.

At a later stage of psychology, our knowledge of mental objects themselves, as having been built up out of elementary sensations simultaneously experienced, was accounted for in virtue of the same principle. This particular case has an extraordinary interest ; and I shall be obliged to return to it later on in this paper.

Everyone is familiar with such facts of recall as those placed in the mouth of Socrates by Plato. Thoughts or memories of past experiences arising upon the occasion of present ones are among the most common experiences of our every-day life. But, in the ordinary way, we are not directly aware of any kind of link whatever between the present experience and the past one recalled. Sometimes, as we shall see, a link is given beforehand ; as a rule it is not—though in all cases it is possible to infer one.

Ex post facto, we can observe relations which do obtain between the object presently perceived ("inducing item") and the recalled experience ("induced item"); as, for example, relations of similarity or difference ; or else we can remember having experienced the objects together in a relation of contiguity. As a matter of fact, we can often do both. And from such observations we can infer relational laws in virtue of which recall of this kind takes place. Upon sight of it, we remember having observed our friend with his harp. But, even here, where the associative link may be held to be one which was set up merely by contiguity in past experience, it should be noticed also that usually in the original experience a further relation than that of mere contiguity was cognized. Our friend was playing the harp ; the harp belonged to him ; or something of the kind. He and his harp formed one "configuration" or

"shape," within which several relations obtained and may have been observed. Indeed, there was a "configuration" only because of the relation or system of relations which constituted it.

III.—CLASSIFICATION OF ASSOCIATIONS.

If we examine a number of such cases of recall objectively, we find it possible to arrange them in classes according to the nature of the relations involved ; for we are always able to educe some sort of relation between the "inducing" and the "induced" items of experience. But this would be no more than a classification in which they were arranged in a logical schema ; as, indeed, is the traditional classification of associations as due to similarity and contrast. But we could never by a merely objective examination determine whether "inducing" and "induced" items had been contiguous in past experience or not. To do this the examination must necessarily be a subjective one. The individual recalling his own past experience must make it for himself. Upon sight of it, he can remember having observed his friend together with his harp. No other person can do this for him. The fact should make one cautious in interpreting any given case of recall on purely objective grounds. Introspection would seem always to be necessary. For, while anyone can always discover relations between "inducing" and "induced" items, it is not necessary to suppose that the relations he discovers objectively were in reality in the mind of the person recalling. But it does not necessarily follow that other relations than those subjectively reported as consciously experienced may not have had their part to play in recall ; for there is much evidence to show that mental items too weak to rise above the conscious threshold still can influence processes which occur in consciousness. Though the two cases—of recall by suggestion and recall by association—thus seem

to be different, I have assumed that relations play an essential part in both. This appears to be evident on reflection ; and an analysis of these relations will constitute the substantial part of the present paper. Without relations, as I shall hope to show, what is commonly called associative recall is not possible.

It will not be necessary to examine in detail the attempts that have been made to reduce the facts of associative recall to the operation of two, or even of one principle. It is generally accepted that spatial contiguity can be reduced to temporal ; and that contrast is a special case of resemblance. Many authors have attempted to reduce the principle of similarity to that of contiguity ; and some have tried to reduce contiguity to similarity. Most, however, accept the two principles of contiguity and similarity as necessary to explain the facts. But I do not remember having seen it noted that these two principles are of a different order, though their operation seems to be almost inextricably tangled in actual occurrence.

In this lies the principal difficulty which I have to encounter in my proposed treatment of the matter. All cognitive process, in adults at any rate, appears to be a texture of sensorial and conceptual threads, crossing and recrossing in such various ways that it is impossible, even in abstraction, to separate them without the risk of disfiguring not only the pattern into which they are woven, but even the single strands themselves. Nevertheless--or so it appears to me--that risk must be taken if we would give any adequate account of the phenomena of associative recall. It may be that in the adult human consciousness we never meet with a pure case of contiguous association or a pure case of conceptual suggestion ; but the cases we shall consider certainly approximate to these ; and I submit that it is legitimate to infer the operation of two distinct and irreducible principles from the facts.

IV.—RETENTIVITY.

We shall begin, then, with a principle which is presupposed by all recall of whatever kind, and the possibility of all recall—that, namely, of Retentivity. We tend to “retain” all cognized experience. If proof is wanted, we have the facts of ordinary memory itself, of perseveration, of recall in hypnosis and under analysis. If we ask what it is that is “retained,” we can only answer that it is the capacity, more or less effectual, to think again the thing given in original cognition; a disposition to cognize again anything that has been cognized as an object. Primarily it is the thing apprehended by the senses that is recalled; and it is recalled as it was originally given—as what I shall call a “whole,” analyzable by abstraction, but not sensorially analyzed into “elements” (sensations) in relation. The relations which appear most to be involved here are those of constitution or conjunction. It is worth while insisting at once that it is by quite another process than sensorial apprehension or sensorial recall that the “elements” and relations constituting the “whole” are abstracted. This latter process is not a sensorial but an intellectual achievement. When, however, abstraction has occurred—that is, when the relations are apprehended as relating the “elements”—then the relations themselves may be objects of thought, as may also the “elements”; and either may be recalled as abstracts. We may thus distinguish concrete, sensorially presented and recalled “wholes,” and abstract, intellectually presented and recalled “elements,” relations, and relational systems.

V.—CONTIGUITY.

We may now turn to an examination of the various forms of mental association; and, in the first place, to association by contiguity. Perhaps the most striking case in recall is that of “wholes” experienced together simultaneously or in immediate succession. On thought of the lover we recall his harp, or *vice*

versa ; when we see his horse we recall the rider. Here, in the original experience in which the association was established, such "wholes" (lover-harp, horse-rider) were certainly given in what we may appropriately call a "larger whole" in which they were sensorially related. It is worthy of note that it is already an effect of abstraction that the "wholes" entering into the constitution of a larger whole can be considered as several. This, no doubt, is a lowly form of abstraction—the relative separation by the mind of one "whole" in experience from another, rather than the relative separation of single "elements" and relations within a "whole." The several "wholes" themselves are related in a looser way than the "elements" in a "whole"; but they are none the less given in relation; and any relation, or system of relations, will suffice to constitute a "larger whole" out of "wholes." The relation must be held to have been cognized; but it is not necessary that it should have been explicitly cognized as such—that is, it need not have been formally abstracted. A sensed relation would appear to suffice. As a simple example, we may consider a red circle superimposed upon a green square. This may be cognized as a "larger whole" or as two "wholes."

In the past experience of adults it may be supposed that any "whole" has been thus sensorially cognized, not only in one, but in many "larger wholes." And the problem arises: Why does a given "whole" A call up B rather than C, D, etc.? The answer would seem to lie in some way in the relation which originally united A and B coming to function again rather than some other relation. In giving this answer here I am anticipating to some extent considerations which are to follow; but it may be said at once that, in so far as the case approximates to that of "wholes" (to be considered in the next paragraph), it is a case of pure contiguity; in so far as it approximates to that in which a relation has been abstracted it is a case of suggestion

"by similarity." The difference is well brought out in a remarkable research upon judgment by Stevanović. In this research nonsense words were associated with series of coloured shapes by contiguity—one nonsense word for each of five shapes that could be included in a class. In attempting to find a particular shape that had thus been associated with a word, one or other of two mental operations was found so to be adopted by the subjects. Either the meaning for the word was reached by way of what may be called a brute associative process; and in that case a large amount of mental energy was expended, for the task—since the words were imperfectly learned with the shapes—was hard. Or else the meaning was reached by way of what Stevanović calls "relationally-directed activity"; and here the task was a relatively easy one, and as a rule attended with greater success. Relations noted in the process of learning the shapes with the words brought to mind the individual shape wanted with greater facility than the mere trying to recall the shape in question because it had been seen when a particular word was pronounced.

We may conclude that the associative revival of one "whole" which has previously been experienced with another, now experienced anew, may take place either because of the present functioning of a relation or system of relations formerly observed to obtain between them; or because of their simultaneous inclusion in a "larger whole." The latter case is assimilable to that next to be considered.

We have now to examine the association by contiguity of simultaneous "elements" (sensations) in a "whole." Examples of this are what Wundt calls "intensive fusions" as, for example, a clang, in which the "elements" belong to the sphere of one sense; or "extensive fusions," as an orange, in which the "elements"—yellow, sweet, soft and the like, together with extensity—belong to several sensory spheres. This is the case

that seems best to lend itself to a purely associationist interpretation. The "elements" seem to be joined merely by an objective contiguity—by the brute force of some mechanical, but (from the psychological point of view) entirely fortuitous linkage, which is engendered by custom and habit.

The associationist position is that the "whole" here is constituted of the "elements" and that these are prior, logically if not temporally, to the "whole," and must therefore be "associated" in order to constitute it. In parenthesis, it is curious to note that associationists never seem to have realized fully the extreme importance of relations in their account of the matter. The view that the "elements" make the "whole" seems to be mere hypothesis, and incapable of accounting for the facts. The "whole," as was noted by Wundt, is something more than the sum of the "elements"; and it is given, as the Gestalt-psychologists have rightly pointed out, as a "whole" or shape. The separate "elements" are reached only by way of an active exercise of abstraction, in virtue of which sensations as well as relations emerge as abstracts. There are, it is true, two interpretations of the way in which shapes emerge in consciousness. In the first, only one moment of process is admitted. The shape or "whole" is just given as such. In the second, two moments are asserted; the relations are superimposed upon the given "elements." The question as to which is the more acceptable view does not seem to be amenable to solution by introspection. But the facts would seem to be adequately explained by contrasting what I have called a sensed "whole" with its conceptually abstracted "elements" and relations. The "whole" or shape is given immediately in a unitary fashion, in so far as it is merely sensed. (Here is our difficulty of the tangle of sensorial and conceptual process and end-product again.) The relation (or relations) between the "elements" tends to emerge in a second moment *by way of*

abstraction. The first fact of cognitional apprehension is the "having of" a "whole"—as Driesch would say, the "having of something." The second fact is the dissolving of the "whole" into parts, *i.e.*, relations and "elements." A proof of what has just been said would seem to lie in the fact that, though one can think an "element" or a relation conceptually and give it a name, it is as impossible to think one sensorially as it is to apprehend one singly. The simplest case to consider is one in which only two "elements" are sensorially apprehended or reproduced in relation—say, a red circle. A given circle can never be seen without some colour; not can *that* circle be represented as colourless—though "circle" certainly may. Of course the "elements" never would be "associated" but for the relation associating them. The "whole" is not an associated sum, but a constituted unity.

One of the classical experimental observations with regard to association by contiguity (the fact was noted by Aristotle) lies in what is known as "forward ephory." (Ebbinghaus, Müller and Schumann, Müller and Pilzecker, *et al.*) Things tend to be recalled in the order in which they were experienced. Nonsense words, for example, tend to be recalled in the order in which they were learned. The recital of the Greek and Hebrew passages in the Coleridge case shows the original order in which the words of the passages were heard. But Wohlgemuth has brought evidence to show that the "law of forward conduction" is not universally verified; that the facts are due to the material learned and the manner of its presentation during learning; that it is a physiological law rather than a psychological one. If the "wholes" learned—nonsense syllables like BAF, MEP, SOG, etc.—are repeated in order they will tend to be recalled in that order; but if they are presented simultaneously, or even successively, so long as there is no movement—as, *e.g.*, a red

colour with a circle, a triangle with green—they tend to be recalled as well in one order as in the other.

This also, it is suggested, is, if not entirely at least in the main, a physiological law rather than purely psychological. At any rate, the sensorially apprehended and recalled "wholes" can be plausibly explained on the ground of the simultaneous excitation of a number of neurones forming a "pattern," the whole of which is liable to re-excitement because of decreased resistances at the synapses due to their previous functioning. In recall, the "pattern" would function as such, and not as isolated neurones—thus corresponding to the "whole."

But even in learning nonsense syllables by repetition, or in learning nonsense syllables together with colours, or colours with forms, we as a matter of fact spontaneously go beyond mere sensorial apprehension. Conceptual processes also enter in. We actively look for relations; we impose more or less arbitrary ones upon the material if we cannot discover "natural" ones—thereby applying relations to the given "wholes." And we certainly recall the more easily the more clearly such relations were found or imposed. In associating nonsense syllables together we look for similarities, differences, rhythms, any kind of relation we can discover between them. We assimilate them to meaningful words, thus increasing the chance of relation-finding. So, in associating colours with shapes, and the like, to succeed the more easily we fit relations between them, even if it be only a conjunctive or constitutive relation we are able to employ.

To return from this consideration to the case of simultaneous "elements" with which a relation is given as forming one "whole," we note that this is *always* a sensorial "whole." It may be considered by us as a red circle, or a circular red, or as a thing constituted of redness and circularity related. But these are abstractions, and pertain to an essentially different mental process than that of mere sensorial apprehension or representation.

Before drawing any general conclusions in regard to association by contiguity, we may summarise what has been so far said as to the association and the recall of "elements" and "wholes."

- (1) The *association* of "elements" by contiguity requires that a relation hold between them; but this relation need not be explicitly cognized or abstracted. (Over and above this, there is an interest, or conative attitude, instinctive or acquired, towards the related "elements." That there are objective conditions of such an interest or attitude is not denied; but into such further questions we need not enter at present.)
- (2) The *recall* of "elements" contiguously associated in "wholes"—abstracting from deformation due to various causes such as sheer forgetfulness, confluence, creative additions, etc.—brings them to mind in "wholes." This is largely a physiological process.
- (3) The *association* of "wholes" by contiguity similarly requires a relation between them. The relation need not be explicitly cognized; but the more explicitly it is cognised the more closely are the given "wholes" associated. (Interest and conative attitude, etc., may be noted as above.)
- (4) The *recall* of contiguously associated "wholes" is secured by the operation of a relation sensorially apprehended, or conceptually abstracted, in the original experience. Here appears to be a mixed case of purely contiguous association (as in that of "elements") and of the evocation of "similars" (*vide infra*). The clear awareness of any relation between contiguous "wholes" certainly facilitates their learning and recall. This has been borne out in experimental work; and, indeed, accounts for the

difference in case with which logical and nonsensical material of any sort is learned. The intermediary relations between "wholes" may be pure relations, or they may be relations imaginally carried.

This brings us to a problem somewhat similar to one already considered :—Why does one relation obtaining between contiguous "wholes," whether sensorially apprehended or conceptually noted, function instead of some other in recall ?

Several solutions might be suggested according to the nature of the case. For example, the relation in question might be considered to be part of one of the "wholes" presently given—a part, even, which was relatively heightened in clearness by a partial abstraction during the original experience. Such an answer would rely on the observation that "wholes" come to mind as "wholes," and that the relation formed part of each sensorially apprehended "whole" within the "larger whole." If a given "whole" A had been experienced together with another B, and neither had ever been experienced together with any other "whole," the case would seem to be like that of a single "whole"—say, one definite orange once cognized—which presumably would always come to mind identical with itself. And further, if the sensorially apprehended relation were also abstracted in the original experience, this might facilitate its re-occurrence on the occasion of the representation of the "whole," and thus determine still further the recall of its correlate. Such relations, when they have been experimentally noted as obtaining between "wholes," may come to mind before recall of one of the "wholes" when the other is given because they are actively searched for. When, on presentation of one, we try to remember the other of each pair of words (or objects) definitely associated on a particular occasion, we frequently search for a relation first, and then the wanted word just comes.

But more frequently still, according to introspective reports of such cases of recall, the relation noted emerges only *after* the wanted word has come to mind. And then it is recognized as precisely that relation which was noted in the original experience of associating. In this case it may certainly be suggested that the relation in question has functioned as a kind of Determinant Tendency; which would bring recall of this sort into line with a great number of phenomena of which we possess a satisfactory explanation. The general conclusions we have now reached may be stated as follows :—

- (1) Association by contiguity is a sensorial process.
- (2) It has a purely physiological basis.
- (3) Psychologically, the noting or abstracting of relations often intervenes, and is superimposed upon it.
- (4) All recall takes place by way of relations :—
 - (a) intrinsic to “wholes”; when there need be no abstraction, but the whole process is sensorial.
 - (b) extrinsic to “wholes,” but mediating between them in a “larger whole”; when possibly no abstraction may be involved, but certainly abstraction facilitates recall.

The principle of contiguity may probably best be summed up in the formula that—We tend to recall any item of past experience whenever a present item, together with any relation previously sensed as linking together the two items originally apprehended, is experienced. The problem, both in the case of single “wholes” and related “wholes” has to do with how precisely the relation is actually secured at the moment of recall.*

* In the principle of contiguity it is assumed that identical items sensed in relation in past experience tend mutually to be recalled. It is—as James says—the objects, not the thoughts, that are recalled; the “ideas”—in Locke’s terminology—not the ideation. The thoughts are absolutely new events, never having occurred before.

VI.—SIMILARITY.

We now turn to the principle of similarity. This has usually been stated in the sense that like objects tend to recall their like or contrasted objects. For various reasons psychologists have attempted to reduce all the cases to a single principle of similarity; though some have insisted on the causal relation as providing large numbers of cases of recall.

In truth, it would seem that the principle could best be stated as one in virtue of which *any* relation applied to *any* present "whole" (or relation or conceived "element") may function in the recall of its correlated "whole" (or relation or conceived "element").

In support of the formulation just advanced, it may be urged that any relation if given beforehand (*i.e.*, consciously present) with the instruction to apply it to "wholes," etc., *to be given*, actually brings about the result stated (dependently on the amount of retentivity, "g," etc., of the person tested). The person, consciously applying the relation to the "whole," recalls an item in that relation to it. The words "consciously present," however, have been omitted from the formulation of the principle; since it is of wider scope than they would imply. The accepting of the instruction—in this case, to apply the relation given—creates a mental set, or Determinant Tendency (Watt, Ach, *et al.*) in virtue of which, even when the relation is no longer in consciousness, the correlated "whole" is in fact recalled. And the recall of any mental item in this way is as much determined as is the movement of a finger in simple, choice, or other reactions. Given a constrained association test—a test of analogies, opposites, or the like—the recall of the determined item follows.

But there is another case, and a far more common one in ordinary life, in which the relation is not given beforehand as in these tests. This second case requires explanation; and the

problem arises :—Why, in the presence of any one item, does some particular relation in fact come to function? A great many reasons are possible, of which some may be suggested as at least providing partial answers.

(1) It is known that a present “set,” or circle of ideas, or mood, tends to determine the relation of the induced to the inducing item. Thus, occupied—say—in thinking of sport, “hook” would tend to make us recall “line” rather than “eye.” In a depressed mood, “money” would suggest “debts” rather than “credit.” The familiar experiment of inserting a nonsense word something similar to a meaningful one in a list of words shown tachistoscopically, shows how the nonsense word is interpreted by way of the meanings of the others. Thus ROSE, VIOLET, TULIP, LILY, being exhibited, PAWKY tends to be perceived as PANSY: just as misprints are read correctly in a text.

(2) Further materials for an answer might be suggested in facilitation, perseveration, interest and the like, at the moment of recall.

But if, for *any* reason, a present item —“whole,” relation or “element”—together with any relation is in mind, or even if the relation in question has only set up a Determinant Tendency, we tend to call up the correlated item.

I have stated this quite generally, so as to include what has been called the “eduction of correlates,” as well as correlate recall. For the process may occur with either one of two results, or with a mixture of both. Thus,

- (1) the correlated item may simply be recalled; or,
- (2) it may be created—never having been previously experienced; or
- (3) it may be partially recalled and partially created.

As examples of such results we may consider the following cases :—

(1) Recall.

- (a) What *is* the Eiffel Tower ?
- (b) Who was *the father of* King George ?
- (c) What colour *was shown with* the circle ?

Such questions could never be answered without previous knowledge. They imply previous contiguous experience in the apprehension of “ wholes.”

(2) Creation.

- (a) What hue *lies midway between* two given hues ?
- (b) What is the *opposite of* benevolence ?
- (c) What is *like* justice ?

I presume, in these examples, that the testee has never answered the questions before, nor had the answer in mind.

(3) Creation or Recall.

- (a) What stands to long *in the relation in which* light stands to heavy ?
- (b) What is the *contrary (opposite, contradictory)* of white ?

(4) Part Creation, part Recall.

- (a) What stands to beauty *as statement stands to* truth ?
- (b) *Bitter is to quinine* as sweet is to . . . ?

Having thus included cases of recall with cases of noegenetic correlate eduction in a single formula, we may ask if it is possible to interpret the facts of recall in the light of Spearman's third principle of original cognition. And here, it seems, a distinction must be drawn.

With regard to recall “ by similarity,” we may answer affirmatively if we may be allowed to read instead of “ similarity ” “ *any* conceptual relation whatever.” Any relation, together with any item, can generate the correlated item. This may be either creation or recall. It is recall if the correlated item has ever previously been cognized.

With regard to recall “ by contiguity,” again we may answer affirmatively in so far as the relation previously experienced

with the items in question, together with one of the items, can generate the correlate. But, in so far as the several items must have been experienced in some definite, concrete relation (as, *e.g.*, the King and his father, the colour and the circle, the constituent "elements" of the tower, as well as these together with its name) the answer would appear to be negative. All such cases, as we have seen, are sensorial; *i.e.*, the items related are experienced and reinstated as concrete "wholes" on the sensorial level. If we are to relate such cases to any of Spearman's noegenetic principles, it must be to the first:—"We tend to evoke immediately a knowing of the characters of any lived experience." "Elements" and relations are sensed, or "elements" are sensed in relation; and they are recalled as related in the same way. The emergence of the relation *as such*, or of one of the "elements" in relative isolation, is due to abstraction, and is not sensory apprehension. But the abstracting of the relation (in virtue of Spearman's second principle) does not in any way alter the given "whole." If, for any reason, we think the "whole" again, that is a case of recall; and whenever we recall sensory material, as we have seen, we recall "wholes," never isolated "elements" or relations.

Association "by contiguity," then, is thus essentially a sensory process, as we have suggested, and not an intellectual one; though it may be shot through and through with conceptual process as well. It is conceivable that several "wholes" may be associated in a merely contiguous way, provided that all their "elements" are sensed in relation within a "larger whole." Our red circle superimposed upon the green square was a case in point. It can be apprehended and recalled as a "whole" or as two "wholes" related—though in the latter case there is already a lowly degree of abstraction.

All other cases of "contiguity," it would seem, are capable of being included under the head of suggestion "by conceptual relation"; by which we mean that recall takes place by way of

any relation whatever, such relation having been actively cognized, educed or abstracted during the original experience.

Thus all associative recall, and the possibility of all such recall, other than that of "wholes" which is sensory, is due to an intellectual achievement. When one "whole" is recalled by us on the occasion of sensing or representing another "whole" (with the sole exception of the case in which these may be considered as forming and having formed a "larger whole") that is because some relation between the two was abstracted when they were experienced together.

Or else it is because a relation, or system of relations, abstracted from any past experience whatever, now functions together with the "whole" presently sensed or represented in the recall of any "whole" whatever previously experienced.

VII. -INDICATED CONCLUSIONS.

I do not propose to do more than indicate one of the conclusions with regard to the nature of mind which I believe to follow from the considerations developed in this paper. The so-called "laws of association" as usually stated are not laws at all; for a law is a formula which explains the reasons for the facts observed; and these "laws" do little more than state the facts. Professor Stout comes nearer to expressing them in a law when he says that contiguity explains them because of community of interest; whereby he relates them to conation as a fundamental expression of the nature of mind. In the present paper I have attempted to relate all the facts to two irreducible categories; and that I have only been able to indicate that such a reduction is possible is due to the almost inextricable interpenetration of the two processes shown in every example that one can take for consideration. In recall there always seems to be a part played by contiguity of past experiences as well as the actual presence of some relation which mediates the item now before the mind and that recalled. This can only suggest

that, in adult consciousness at least, sensorial processes are intermingled with conceptual and *vice versa*. But this is not a peculiarity of associative recall. Numerous other instances, of which perception is an example, could be given in which process and product alike involve both the sensorial and the conceptual level of mind. Both, no doubt, are active or dynamic, and seem correctly to be characterized by Stout's term "conative." But they are not reducible. The individual sensed or recalled is not the abstract; and abstraction and conception are not sensing.

It would seem here that the old distinction of "powers" by reference to their formal objects was not so inapt, since we can have before mind concrete "wholes" sensorially and also abstract relations and the like conceptually.

Moreover, we have seen that, while "wholes" are given as coherently "shaped" in recall by reason of "contiguity," conceptual relations have an immense part to play in recall of all other kinds than this. I have attempted to account on physiological grounds, at least in the main, for the occurrence in recall of a "whole" as a "whole." But I do not think that this can be the case with regard to the recall of a "whole" when an abstracted relation is applied to another "whole." This case, I believe, is assimilable to that of noegenetic correlate eduction, as are all the other cases of recall of "elements," relations and systems of relations when a given abstracted relation is applied to a fundament.

All these, I submit, are purely psychological processes, of which no explanatory account is given by or can be looked for from physiology. Concepts of bodily function do not help us to understand them; and we must fall back upon a concept of the mind as active, creative in noegenetic function, and in a sense creative even in recall. The experiential basis of this concept is furnished, I maintain, in the immediate and intuitive awareness of the Self as active which I developed in a previous paper communicated to this Society.

*Meeting of the Aristotelian Society at 21, Gower Street, London,
W.C.1, on June 20th, 1927, at 8 P.M.*

XV.—THE SIGNIFICANCE OF THE ARGUMENT FROM DESIGN.

By W. G. DE BURGH.

1. Everyone is familiar with Kant's criticism of the teleological argument.* In its traditional form, it is open to the objection, anticipated by Hume, that the *a posteriori* evidence fails to yield a "determinate concept of a supreme world-cause." At best, the facts suggest the *thought* of Nature as a teleological system, a thought devoid of ontological validity, a "regulative" idea, necessary to guide the interpretation of Nature, but in no wise "constitutive" of its order. It is a principle of the "reflective," not of the "determinant" judgement. Under the guise of an empirical appeal, "the physico-theologians have reached their cognition by a very different road from that of experience." For the teleological argument presupposes the cosmological, which in turn presupposes the ontological. And, as all the world knows, Kant rejected the ontological argument on principle. "The subjective conditions of our thinking" cannot be taken as "objective conditions of things themselves."†

2. I have opened with this reference to Kant, because I believe his criticism, save in one vital point, to be well-founded. The facts cannot do more than indicate or confirm a hypothesis that goes beyond experience. They do not suffice to prove a purposive order of Nature, let alone the God of Theism. It is true, again, that the teleological argument suffers violence if severed from the cosmological. Plato showed a sure insight, when, in

* *Kr.d.r.V*: A 620 ff., B 648 ff.

† *Prolegg*: § 55.

proving God's existence in the tenth book of the *Laws*, he combined inference from communicated (*i.e.*, contingent) to self-initiated (*i.e.*, necessary) motion with that from the uniformity and perfection of stellar movements to a divine mover of pre-eminent goodness. Moreover, I entirely agree with Kant in his insistence on the ontological implication. We must remember that he never questioned "the necessity, in the speculative interest of reason, to regard all order in the world as if it originated from the intention or design of a supreme reason."* Hume's objections are brushed aside as irrelevant to the purely regulative value of the idea. I hope in the sequel to show that Kant was right in this view of the speculative interest of reason. But was he equally justified in the assertion that "we have not the slightest ground for assuming an object corresponding to this idea"?† We must distinguish between the ontological argument in the restricted form in which it came to Kant from Descartes through Leibniz and Wolff and its generalized form as an inference from the requirements of reason to the order of reality. The validity of the latter is the vital issue. But in any case the telological argument rests on *a priori* as well as on *a posteriori* ground, and stands or falls with its implicit ontological assumption.

3. Before proceeding further, I would like to call attention to certain qualifications, especially in Kant's later writings, which have a wider bearing on the subject of my paper.

(a) Despite the fact that it is riddled with fallacies—its own, in addition to those that vitiate the two other arguments—Kant invariably speaks of the argument from design as "deserving of reverence." "It is the oldest, the clearest, and the most accordant with the common reason of mankind. It animates the study of nature, as it itself derives existence and draws ever

* A 686-7, B. 714-5.

† *ib.*

new strength from that source. . . . This knowledge of nature again re-acts upon the idea, its cause ; and thus raises our belief in a supreme author of the universe to an irresistible conviction. Hence it would be utterly hopeless to attempt to rob this argument of its authority.”* Kant’s democratic sympathies were, no doubt, attracted by its appeal, allied, as we shall see in a moment, with that of the Moral Law, to the unsophisticated intelligence of the man in the street. But there is more in it than this. In the *Kritik of Judgement* he remarks that purposive phenomena in nature evoke, prior to any explicit reasoning, a feeling akin to the religious, a sense of an unknown power behind phenomena, that is awesome or, in Otto’s familiar phrase, “numinous.”† We find an impressive confirmation of this experience in the recently published notes by Cook Wilson “on the Rational Grounds of Belief in God.” Pointing out how the objections to the argument from design, which seem fatal when formulated “in a general abstract way,” tend to vanish when we are confronted with the concrete facts, he writes : “ We may imagine we have got rid of it as a prejudice or illusion ; but if, forgetting our general theories, we are absorbed in the study of the adaptation and harmony of the various parts of a plant or animal to the maintenance of its life or function, is there anyone so adamant that he can maintain an unemotional contemplative or ‘ scientific ’ attitude ? Can he help feeling admiration and wonder ? Whether it be an illusion or not, the idea of plan or design and choice of means comes on us with irresistible force ; we cannot shut it out.”‡ Is there not here, I would suggest, something more than a mere emotional disturbance, something of the character of vision, comparable to that experienced by Wordsworth or Shelley in their awareness of veiled presences in nature ; a vision that, if we are not unwarrantably to mutilate

* A 623, B 651 : cf. *Kr. of Judgement*, § 91.

† *Kr. of J.* § 91, note.

‡ *Statement and Inference*, ii, § 571.

reason, must be regarded as intrinsically intellectual, as the revelation to knowledge of a reality? The intensity of an emotion is, of course, no criterion of the truth of an associated belief. Yet even if, with Kant, we construe the experience in question as purely emotional, there is a certain paradox in the contrast between the strength and universality of the feeling and the logical shortcomings in the conviction that it generates; a paradox which becomes well-nigh incredible when, with Kant, we acknowledge the validity of the conviction as a clue to the scientific interpretation of Nature.

4. (b) Dr. Kemp Smith has shown in his commentary* how Kant, when treating of the ideas of reason in the first *Kritik*, wavers between the sceptical position that they are merely heuristic principles, empirical in origin and devoid of transcendental validity, and the truly critical position, inspired by the *Analytic*, that they are necessary conditions of the possibility of experience, and furnish the criteria for the distinction between the phenomenal and the noumenal. "It is difficult," wrote Kant, "to understand how there can be a logical principle by which reason prescribes the unity of rules, unless we also presuppose a transcendental principle whereby such systematic unity is *a priori* assumed to be necessarily inherent in the objects."† In the *Kritik of Judgement* he discriminates between the "natural purposes" revealed in phenomena of organic life and the idea of nature as a unified teleological whole, or, as Bosanquet put it in a paper read to this Society, between "finite purposes" and "a speculative teleological system."‡ The former, Kant admits, defy interpretation on mechanical lines. "The internal form of a mere blade of grass can show, sufficiently for our human faculty of judgement, that its origin is possible only according to the rule of purposes." This recognition carries

* *e.g.*, pp. 547 ff, 553 f, 558 ff.

† A 650, B 678 : *tr.* Kemp Smith.

‡ *Kr. of J.* § 67 : Bosanquet in *Proc. of Art. Soc.*, 1911-12.

with it two implications—(a) A purpose implies a purposive intelligence.

To deny, as did the Epicureans, “intentionality, *i.e.*, designed determination, to purposive production” is to reduce purpose to blind chance, in which case “nothing is explained, not even the illusion in our teleological judgment.”* In other words, a purpose which is not the purpose of a mind is robbed of all its meaning. I submit that, for all the advance of biological science since 1790, Kant’s words are as true to-day as they were then. (b) Secondly, he points out that the concept of “a natural purpose” leads necessarily to the idea of collective nature as a teleological system.† Here again Kant is surely right. Reason cannot acquiesce in a bare plurality of finite purposes or stop short of a unified speculative teleology. As Professor Taylor has recently said,‡ if there is purpose anywhere, there is purpose everywhere. The facts themselves point to this conclusion. Teleology cannot be confined to living organisms, but must be enlarged to cover their context and antecedents in the fields, *e.g.*, of geology and astronomy.

5. (c) In the *Kritik of Judgement*, the teleological argument is handled in close association with the analysis of moral experience. Kant thus justifies the reverence which it universally inspires. Moreover, its regulative use in speculative knowledge is “established” for practical reason on an ethical basis. The ontological assumption, discarded as a philosophical argument, comes by its own as an implication of moral faith. “The mere idea of God,” we read in the *Opus Postumum*, “is at the same time the proof of His existence.”§ The reality of the moral law involves that of a teleological order, as the noumenal ground of phenomenal nature. In the light of this assurance the empirical

*§ 73.

† *ib.*

‡ In *Essays Catholic and Critical*, pp. 57, 58 and *note*.

§ Webb: *Kant: Philosophy of Religion*, p. 191.

evidence is invested with a new significance. Kant certainly holds to the end by his distinctions of phenomena and noumena, and of practical and speculative reason. But is any thinker prepared to endorse them now in the rigid form in which he presented them ? The support furnished to speculative teleology by the moral consciousness retains its force independently on adhesion to the critical philosophy. Even for Kant, practical reason is reason still, with primacy to boot over the speculative ; and the teleological idea, already a necessary *thought* of speculative reason, is " established " by practical reason in the very heart of reality.

6. The teleological argument, then, is ontological and *a priori*. It is ontological, for it implies that the universe is responsive to reason's demand for intelligibility, and that the demand can be satisfied only by a purposive system. It is *a priori*, for its claim does not admit of empirical proof.

(a) Let us take, first, the ontological postulate, postponing for the moment the question how far intelligibility implies a teleological order. The issue is not that of the inference to a personal and transcendent God, so decisively rejected by Kant ; but the wider one, to which, as we have noted, he gave an ambiguous answer, of the conformability of the real to reason. I confess myself unable to understand how, when the nature of this assumption is once realized, it can be disputed by any philosopher. It is, of course, incapable of demonstration, for it is presupposed in the very attempt to prove it. It represents an act of intellectual faith, at once necessary and incontrovertible ; affirmed in the act of denial. The intellect cannot question the truth of what it apprehends to be necessary ; and the only necessity it recognizes is the necessity of what is perfectly intelligible. I would not dwell upon this point here, were it not that it has been obscured by Kant's severance of phenomena from noumena and of the regulative use of reason from the constitutive. The logical outcome of these distinctions is the

divorce of knowledge from reality all along the line. Such a radical dualism cannot survive a moment's consideration. The universe can present no intrinsic inexplicability for thought. Unexplained fact furnishes a problem, never a solution. In M. Meyerson's words, "reason is in essence absolute; it does not suffer anything whatever of the real to escape it; all must be subjected to it, all must appear rational; this is the fundamental postulate of human knowledge, on which rest alike science and philosophy.* This faith in the rationality of the real is expressed differently in different ages; Dr. Whitehead has pointed out, for instance, how the belief of modern science in the reign of law has its source in the mediæval belief in the divine reason.† But in essence it is one and the same; that thought gives knowledge, and knowledge is of the real. If I am asked, "what does this platitude amount to? To what purpose is this waste—of words and paper?" I reply: "at least it rules out, neck and crop, the theory of the *Als ob*." There is no half-way house in which the cowardly thinker may take refuge between sheer empiricism and acceptance of the ontological postulate. When, perhaps with Hegel in mind, we cavil at the doctrine that the real is the rational, it can only be because of some imperfection in the meanings we ascribe to "real," to "rational," or to both. As for "real," I am well content to borrow a phrase from Dr. Wittgenstein and define it as "whatever is the case," only begging leave to underline the "is." What we are to understand by "rational" is the main problem of my paper, to which we shall pass in a few moments.

7. (b) The term "*a priori*" also must be disengaged from its Kantian associations. It does not imply independence of experience, or the divorce of the form of knowledge from its content. As Bosanquet has so clearly shown, there is no hard and fast distinction between *a priori* and *a posteriori* know-

* *La déduction relativiste*, p. 322.

† *Science and the Modern World*, ch. i.

ledge. Reason is what reason finds. The facts themselves, as facts, carry the mind beyond their apparent isolation and contingency. They provoke to an *a priori* synthesis. Apart from experience, there is no activity of reason; for reason has its being in the discovery of the rational. Even the *a priori* ontology of the dogmatists assumed that man was in possession of the idea of God. But, once functioning in union with reality, reason, like the experienced fact, is self-transcendent; *i.e.*, it seeks in advance of what it has already found. Nor can it rest until it has found all it seeks. This is its *a priori* character, correlative with, and inseparable from, the organic unity of the object-world. There is here no contradiction, no question of an "either . . . or"; the basic paradox of knowledge, that the mind creates what it finds and finds what it creates, that its self-transcendence is the self-transcendence of the object, is characteristic of all the higher levels of human experience. It is evidenced alike in the inspiration of the artist, in prophetic revelation, in the lover's self-fruit in union with the object of his passion. "Either was the other's mine." In the process of actual knowledge the fusion is never complete; now the one, now the other, aspect is dominant; the vision of reason now piercing the veil of the unknown, the nature of the real now forcing reason to break down the *de facto* unintelligibility. Thus the terms *a priori* and *a posteriori* win a relative justification. For the claims of reason, in their *a priori* character, are provisional; evoked initially by experience, they express the faith that the intelligible order, apprehended by anticipatory vision, is verifiable in the structure of reality.

8. An intelligible universe means an ordered universe. "Since there is a world," says Dr. Whitehead, "we know that there is an order."* The order, he goes on to tell us, is an æsthetic order, and the "ordering entity" is God. My present concern is with the type of order rather than with the ordering entity,

* *Religion in the Making*, p. 104.

though I shall refer to God before I close. There are orders and orders ; is the teleological the type that best satisfies the demand of reason for intelligibility ?

We have, first, to consider the claim of a rival view of rationality. Many thinkers, from Descartes onwards, have interpreted reason, under the influence of modern science, as the faculty of logical deduction, looking to mathematical knowledge for the standard of intelligibility. On such a view, reason is essentially abstract, and its procedure consists in reducing qualitative diversity to quantitative identity. Its ideal, in Dr. Whitehead's words, is "a conceptual world," which "will ultimately finds its complete expression in the equations of applied mathematics."* Dr. Whitehead uses this phrase to describe "the extreme subjectivist" position in epistemology ; but the view is quite compatible with a realism of the Platonic type, for which the conceptual world is at once ideal and real. M. Meyerson, for instance, favours such an interpretation, when he says : "Must we, because relativism has set itself to rationalize physical reality . . . affirm that all in the real that is thus shown to accord with reason cannot be veritably real, but must belong to reason alone, which has somehow projected it beyond itself ? . . . The most rational attitude for the philosopher to adopt to deny it would be the denial by thought of its right to think, is, it seems to us, to assert purely and simply with Plato that in mathematics thought and reality are in agreement. . . . That which is mathematical belongs *at once* to our reason and to nature."†

9. It would be absurd to question either the legitimacy of this procedure, which has proved so fruitful in modern physics from Galileo to Einstein, or the intelligibility that it reveals in nature, by the substitution of rational coherence for *primâ facie* conjunctions of fact. The formulæ of the mathematician with

* *La déduction relativiste*, § 160.

† *Science and the Modern World*, p. 124.

their rigour and certainty, render reality intelligible, within the limits of their application ; but where are the limits to be set ? Is the real confined to what is measurable ? It is not hard to see that the rational, which is the real, suffers violence when restricted to what can be expressed "in the equations of applied mathematics."

10. (i) M. Meyerson has shown that, even within the field of mathematical physics, the irreducible factor in Nature, so far from being eliminated, reasserts itself obstinately at each stage in the advance. The successive simplifications only push the inexplicability further back. The physicists, for all their debt to the mathematicians, refuse, almost with one voice, to acquiesce in the absorption of the real into mathematical abstractions. Throughout its history, modern science is Janus-faced ; its appeal is, on the one hand, to mathematical deduction, on the other, to observation and experiment. The two methods, for all their intimate alliance, never coalesce. There is that about the real that declines to vanish-- to adapt a phrase of M. Bergson--in algebraical, or even in geometrical smoke. Moreover, between the world of pure mathematics and the scene of its applications there is a great gulf fixed. The one is a world of logical possibles, the other of spatio-temporal events. I shall return to this distinction presently, merely observing here that the chasm that severs logic from nature yawns even wider for the conceptualist mathematician of to-day than it did, a century ago, for Hegel.

11. A still graver difficulty (ii) is raised by the qualitative diversity of nature as actually experienced. This diversity is not illusion ; even if it were, the illusion, as a fact, would require explanation. It is late in the day to content ourselves with the relegation of secondary qualities to mind. Dr. Whitehead's protest against bifurcation, his insistence on the objective reality of the world as revealed in the fullness of its beauty and splendour to the painter or the poet, and his justification, on this basis, of the abstractions of mathematical physics, are too well known

to need more than a bare mention. It is obvious, too, that a static mathematical order fails to render intelligible the creativity of Nature and the emergence of new qualities in the course of its temporal development. These features of the real, together with the unpredictable treasures of the future with which the universe is pregnant, remain, for this view of rationality, irrational fact.

12. The same is true (iii) of values. Whether, with Professor Alexander, we regard them as products of the compresence of coherent objects (and what objects are not coherent?) to the mind; or, with Dr. Whitehead and others as inherent in nature (under the selective agency of God), values are manifestly recalcitrant to quantitative measurement. A purely mathematical order, as Spinoza recognized, is indifferent to values. Nor is there anything more significant, in this regard, in the history of philosophy, than his failure to keep true to his relegation of values to the relatively unreal sphere of human imagination, and the necessity that lay upon him to interpret the divine substance as possessed, *sensu eminentiori*, of knowledge, freedom and felicity.*

Experience, in its quantitative and measurable character, provokes to mathematical interpretation, and this, be it noted, in the interest not only of practical control but of theoretical explanation. But it provokes also to the thought of a more comprehensive order. Even Kant, under the sway of Newtonian physics and before the rise of nineteenth century biology, recognized that the mechanism of Nature required supplementation by teleology.

13. The mention of Kant suggests a possible variant of the mathematical idea of reason, resting on a distinction analogous

* See especially the admission, in the discussion of *scientia intuitiva*, of reciprocity of eternal intellectual love between God and man, and the substitution of *Beatitudo* for *Laetitia* in the exposition of this perfect experience (*esp.* Eth. V 35, 36 and Cor. and Sch.).

to that between the noumenal and the phenomenal. The passage of Nature indeed defies reduction to mathematical expression ; but is it not conceivable that spatio-temporal actuality is modelled in the likeness of a timeless order, which as purely conceptual is purely rational ? Such a view would account for the progressive discovery of the approximation of nature to its eternal archetype, and also for the presence of an irreducible residuum of non-rational fact. It is substantially the view of Plato in the *Timaeus*, which has admittedly influenced Dr. Whitehead in his recent work. Now it may well be true that Nature, as a spatio-temporal process, being at any moment in its history incomplete, points by the contingency that infects it to explanation in terms of an eternal and transcendent archetype. But that such an archetypal order cannot be merely or dominantly mathematical was grasped by Plato, who, despite his identification of forms with numbers, never wavered in his conviction that the One, the supreme formal principle in the intelligible world, was at the same time the Good. The mathematical order culminated in teleology. Dr. Whitehead endorses the Platonic view in principle. I shall return to this doctrine later, my immediate concern being with the inadequacy of any explanation in terms of a mathematical system apart from the assumption of teleology.

14. (i) I begin by noting a problem which I am not competent to discuss, but which seems to call for a clear word from the advocates of mathematical intelligibility. Are the ultimate principles of mathematical logic self-evident to the intellect ; or are they, any or all of them, postulated as requisite for the construction erected upon their foundations ? In the latter case, selective purpose enters into the very heart of the logical order. Do they, again, form in their mutual relations a logical whole, or do they stand beside one another in irreducible plurality ? I believe that attempts have been made to present them in a single formula ; but the matter remains one on which the non-mathematical philosopher badly needs enlightenment. How far,

again, can the indefinite multitude of possible spaces be said to present an intelligible system? Further, when we extend our view to Dr. Whitehead's realm of "eternal objects," with its "boundless wealth of possibility,"* the lack of systematic unity is yet more evident. Qualitative diversity, *e.g.*, of greenness from sphericity, is now admitted; but the question, why these objects in their inexhaustible plurality? is unanswerable, for Dr. Whitehead as for Plato, save by reference to the fact of their ingredience into the passage of Nature. Their logical relationships alone are intelligible. Little wonder that for Dr. Whitehead "value is inherent in actuality."†

15. This brings me to two criticisms which I put forward with less hesitation. (ii) The ideal world of the mathematical logician has no room for values. It is a realm of classes and types of order, with their properties and relations, perfectly abstract and ethically neutral. The archetypal heaven as well as the visible has ceased to declare the glory of God. When we turn to Dr. Whitehead's richer world of eternal objects, the issue is more complicated. Goodness and beauty must have a place there, with greenness and sphericity; and, unless they are meaningless, which is unthinkable, it seems a paradox to assert that they contribute no jot or tittle to the value of their actualization. Or are we to take, with the Platonists, a "longer" and surer "way," and solve the riddle of the status of the eternal "possibles" by aid of the "ordering entity," whose thoughts they are, and in whose eternal mind they secure an eternal actuality? In any case, if the timeless order is valueless, it fails to satisfy reason; while, if it finds room for value, it is *ipso facto* revealed as teleological.

16. Lastly (iii), there is the difficulty, insoluble on the logico-mathematical *terrain*, of the relation of archetype to ectype, of the timeless order to the spatio-temporal actuality. Why *this*

* *Religion in the Making*, p. 94.

† *ib.*, p. 100.

selection among possibles? Why, again, any actuality at all? Whatever be the status of the eternal objects, they are certainly not events. The two worlds stand over against one another in unmediated distinction, intimately akin in certain aspects of their structure, yet severed by an abyss, so near and yet so far; the one "a block universe" of abstractions, the other instinct with life and creativity. To the purely logical intellect, the antithesis presents an inexplicable mystery. Thus, here again, we are led forward to seek a more concrete use of reason, a more concrete type of rational order, that may, in some measure, (a) comprehend quality and value, (b) illuminate the relationship of the timeless to the temporal, and (c) justify, within its scope, the relative intelligibility of the mathematical view of nature.

17. The demand is for an order that expresses rationality in a form at least as full as the richest in our experience. Philosophy, as in Plato's phrase "synoptic"—the *θεωρία* "of all time and all being"—, has to guard unsleepingly against "the fallacy of misplaced concreteness."* The certainty and impersonality of mathematical science beguile the mind into thinking that reason finds fulfilment there as nowhere else. In the sciences as elsewhere, reason covers more than reasoning; the vision of faith is discernible alike in postulate and in explanatory theory, anticipating and perfecting the explicit processes of inference. I will not labour here how, in all intellectual, moral and æsthetic activity the intuitional factor is inseparably allied to the inferential, how a rational faith and logic are complementary functions of one and the same reason. To deny intelligibility to a symphony of Beethoven or to the spiritual pilgrimage of a St. Bernard or a St. Francis, is to take the road to ruin. Its certain issue is the relegation of purposiveness and value to the limbo of mystery and superstition. There can be no question of any Kantian bifurcation of reason into the speculative and the practical.

* *Science and the Modern World*, p. 72.

There are not two intelligences nor two intelligibles, but one intelligible and one intelligence. This is the metaphysical faith, "which except a man believe faithfully, he cannot be saved." The idea of a teleological system may have limitations, but it must at least fall within, not outside, the scope of reason.

18. I have referred to the natural prejudice of science in favour of an impersonal view of Nature. In the teleological argument it scents the bugbear of anthropomorphism. Certainly, ethical neutrality cannot be reconciled with a purposive interpretation. But it is equally certain that as human beings we cannot escape from taking human reason as the measure of our thinking. Those philosophers who, like Aristotle and Spinoza, have been most studious to rid themselves of anthropomorphism, have set mind, interpreted in the light of man's highest intellectual experiences, at the heart of reality. Moreover, the assumption of an impersonal mathematical order, with its implication that the real conforms to the standard of our rational concepts, is guilty of the very anthropomorphism that it is devised to exclude. Naturalism is even more open to the charge, when it infers from the process of emergent evolution within the limited range of human observation to its continuance, at ever higher levels of perfection, through the illimitable universe of space-time. The true safeguard against anthropomorphism lies not in the exclusion of the interests of man's reason, but in affirming its inherent capacity for self-transcendence. Its consciousness of limitation presupposes, as Descartes insisted, a positive standard of perfection. The *via analogica* of ancient and mediæval Neo-Platonism, with its appeal to the *sensus eminentior*, far from being an ignoble device of anthropomorphism, is the only refuge from its abuses. It is in the light of *id quo maius cogitari nequit* that we are enabled to distinguish between our purely personal wants and the *naturale desiderium* of reason. "The human mind has adequate knowledge of the

eternal and infinite essence of God.”* Adequate, be it observed, but not complete. Here is the safeguard. If purposiveness be the highest form of rationality within our experience, we are warranted in holding that reality is purposive; we are not warranted in holding that it is nothing more.

19. When we turn to Nature and consider the purposiveness there displayed, we cannot fail to be struck by its pervasiveness. We find ourselves in the presence of a multiplicity of finite purposes, each of which is fragmentary and incomplete, but which are everywhere exemplified, are interlocked one with another and imply, each of them, an almost unlimited field of relevance. The term “purpose” can no longer be restricted to conscious human activities or to the behaviour of infra-human animals or of plants. Dr. Whitehead’s doctrine of prehensive unity in events, bringing the atom, the electron, and even the point-instant (if such entity there be) under the category of organism, has evoked, if not a general acceptance, at any rate a sympathetic response from philosophers and scientists. Professor Alexander, with his analogy (though it be no more) of time as the mind of space, General Smuts, with his concept of creative Holism as the driving force of the universe, and our own President, with his association of the psychical and the physical along the entire line of emergent evolution, voice, in their several ways, a republication, in the light of advancing knowledge, of Spinoza’s famous *dictum*: “*omnia, quamvis diversis gradibus, animata tamen sunt.*”† We may say, negatively, that the word “mechanism,” in its traditional meaning, is no longer manifestly applicable to Nature; and this is why, save in reference to Kant, I have avoided it in the present paper. Positively, the concept of organism, with its implication of structures whose arrangement forms a natural whole, under a plan of combination that is more than the aggregate of the parts and that controls their functioning,

* Spinoza: *Eth.* II, 47.

† *Eth.* II, 13 S: cf. Alexander in *Chron. Spinoz*, tom. 5, pp. 16, 17.

is closely allied to the concept of purpose. In any case, its application beyond the field of the biological sciences to that of physics carries with it the insufficiency of a purely mathematical interpretation of the physical. Further, apart from this modern view of nature as through and through organic, the purposiveness indisputably present in human action cannot, as we have already seen, be isolated from its apparently non-purposive context. Human designs, again, imply as necessary for their actualization, the fact of law in the physical and moral worlds. A purpose would be futile, were we unable to foresee its issues on things and persons. We discover here a clue to the relation between the concrete order of teleology and the abstract order of mathematics. From the latter to the former there can be no passage, whereas the former includes the latter as the condition of its fulfilment. There is no contradiction possible between purposive action and physical law. Processes that can be described, *quâ* motions, in physical terms; *quâ* living processes, biologically; *quâ* acts of human consciousness, psychologically; can at the same time be conceived, with perfect consistency, as the manifestations of intellectual, moral or æsthetic purpose. No one in his senses, to say nothing of his reason, would suggest that the movements of the etcher's hand over the plate, be the hand a Dürer's or a Rembrandt's, find full and sufficient explanation in the mathematical formulæ of the physicist. Yet they conform, *quâ* physical movements, to physical uniformities. Without such conformity, the genius of the artist would lack expression; that is, it would not *be* at all. So, too, for the religious consciousness, the advance from mathematical equations to particular providences comes, not to destroy, but to fulfil. Individuality and value are thus brought within the scope of rational order, without detriment to the claims of generality. The artist's mastery is evidenced most clearly in the meticulous precision that he lavishes upon the minutiae of his work. It is the same in every branch of purposive activity. There are no little things,

to be neglected or despised, in finance or administration, in intellectual research or æsthetic creation, in interchange of love or the service of God. "Not one sparrow shall fall to the ground without your Father."

20. The purposes observable in Nature are finite purposes; and finite purposes, while they suggest the thought of a teleological system, never suffice to prove it. Nature is not, and cannot be, experienced as a whole. Yet the limitations of finite purposiveness themselves point beyond Nature to a teleology that is both rational and real.

(i) A finite purpose, as temporal, is incomplete at any moment of its history. Plan precedes fulfilment, and the art or work of art, be it ever so perfect, remains in some respect "unfinished." Each purpose, again, leads on to and merges in fresh purposes, thus revealing imperfection, not only in execution, but in intention. "There is no felicity but in proceeding." Yet the fulfilment, such as it is, is not confined to the close of the process, but is immanent throughout; in Aristotelian phrase, the process implies "act" and, thus far, transcends merely temporal analysis. Moral experience, as interpreted by Kant, furnishes an illustration. The advocates of Naturalism will demur, but I am convinced that, in willing *this* duty *here* and *now*, the man wills duty universal, that the perfect measure is at once transcendent and immanent in each phase of its temporal enactment. Thus finite purposes, for all their temporal limitations, bear about them the mark of a timeless purposive attainment. They point beyond their incompleteness to an ideal purposiveness, in which perfect thought and perfect actualization are undivided moments of a single experience, and desire for the not-yet-existent is quenched in the consciousness of a good, at once willed and enjoyed in the act of volition. Purpose, it has been well said, intends perfection, never frustration or defeat.* I readily admit

* Turner, *Nature of Deity*, pp. 85, 89, 113.

that, if we follow out this implication, the term undergoes transformation of meaning, and that we must discriminate, with Kant and Bosanquet, between finite purposes and a teleological whole. The former are temporal, because lacking in complete self-possession; while the latter "is the perfect and complete possession of self by self, and therefore is timeless."* But I fail to see that the transformation is illegitimate, or that the term "purpose," when used of such an "eminent" experience, is more open to criticism than the terms "life" or "spirit," which Bosanquet and Bradley admit as characterizations of the Absolute. An infinite purpose and a teleological whole are the same thing.

22. (ii) But, it may be said, an infinite purpose is a self-contradictory idea. This is, in fact, the nerve of Bosanquet's criticism of teleology. A purpose, he tells us, is "a partial phenomenon within a totality."† It is true that finite purposes need materials and an environment that stretches indefinitely beyond the immediate field of relevance. Hence no purposive act is self-dependent; the agent's freedom is conditioned, and often thwarted, by what lies apparently beyond the scope of the intention. But we must realize the relativity of this distinction. The so-called materials or means are never merely external to the end, but rather constituents of its expression. The poet finds inspiration in the world around him; his poem is a thing he "half creates and half perceives." The sculptor, as Professor Alexander has lately told us, *discovers* the Hermes in the marble. This is the lesson to be learnt from Aristotle's paradox, that the form in the mind of the artist or the thinker is one and the same with the form in the work of art or the object known. Plan and execution develop as moments in a single process; as when the writer's thought wins clarity and concreteness with the words he writes. So in the moral life, the seeming obstacle proves to

* *Proc. of Ar. Soc.*, 1911-12, pp. 248-9.

† *Indiv. and Value*, App. II to lect. x,

be not a thing but an opportunity ; suffering appears inseparable from joy, and the self first wins free expression' in the response given back from the hand or heart of another. The relation of end and means, of a design to its materials, is inadequate to describe the facts. " You cannot gather material for a purpose out of no situation."* True though this be of finite purposes, are we driven to endorse Bosanquet's conclusion that the idea of purpose in itself implies a reference to a wider whole, and is therefore inapplicable to the Absolute ? I cannot discuss this objection as it deserves, and will merely point out (a) that I entirely agree with his rejection of the answer that the materials for an absolute purpose are to be discovered in the realm of timeless " possibles." " Possibility is within the real, not reality within the possible." † I believe that the problem of the status of possibles can only be solved on the lines of the Neo-Platonic doctrine that they are thoughts of an actual eternal mind ; while (b) the key to the main issue was also furnished by the Neo-Platonists, in their teaching that the causal relation is transitive and asymmetrical, and that it is of the nature of transcendent Being to go forth from itself in creative activity.‡ Bosanquet has not, so far as I know, considered this alternative, so alien to the whole spirit of his philosophy. It led, in Christian Platonism, to the conception of God expressing His eternal purpose in a world other than Himself, by an act needing nought for its consummation save the intrinsic plenitude of His perfection.

23. (iii) Purposiveness in Nature is displayed in an indefinite multiplicity of particular purposes which, for all their interconnections, defy reduction to a coherent system. Deferring for the moment the question of the general purposive *nisus* in Nature, and confining our view to human purposes, this lack of coherence is evident both in the clash of personal and group-interests, and

* *Indiv. and Value, loc. cit.*

† *Meeting of Extremes, p. 180.*

‡ See Prof. A. E. Taylor, on *The Philosophy of Proclus, Proc. Ar. Soc.*

within the bounds of a single individual life. When all allowance has been made for the unifying power of knowledge and goodness, on which Plato laid such stress, the aspect of conflict, in the heart and mind of the individual and in his relations with his fellows, appears more pronounced at each stage in the advance of civilization. Knowledge and goodness bring not peace only, but a sword. This fact is shattering to the dream of temporal progress nursed by so many of the Naturalist writers of to-day. But it is incident to temporality, and constitutes no bar to the conception of an ideal teleology, in which perfect unity of system is not merely compatible with, but demands, a unified plurality of wills. The analogy of "prehensive unification" on the higher levels of our experience, such as the finding of self in self by the lover or the mystic, debars us from setting any inherent limits to the possibilities of purposive coherence.

24. (iv) Purpose intends not merely coherence, but value; in the old phrase, an act is willed *sub ratione boni*. Reason demands the harmonious actualization of every type of value; a coherent immoral or a coherent ugly world would fall short of the standard of rationality. Here, once again, the facts of temporal experience belie the claim. For one thing, the values realized fall asunder; the *verum* is not *ipso facto* the *pulchrum* or the *bonum*, and the dictates of duty notoriously conflict with those of prudence. Further, we are confronted everywhere by the presence of disvalue. I do not propose to discuss here the problems of suffering, error, ugliness and moral evil; nor could much be said on the subject that is not familiar to my hearers. I content myself with a bare indication of their obvious bearing on my general argument. True though it be that evil tends to issue in disillusionment, that finite purposes vitiated by error or bad intention owe their transitory and partial coherence to the immanence of something that is good, that facts of disvalue furnish material for valuable purpose and are absorbed and remoulded in the interest of good, as when the artist's vision

fashions out of the factory chimney and the slagheap a work of abiding beauty ; yet it is only a faith which pierces beyond the temporal to the eternal that can bestow on these, its imperfect manifestations, a privileged position among the things of time. When, again, we think of man, or of all Nature, as struggling to work out a destiny that can only have spiritual value if it be self-achieved, and can only be self-achieved at the cost of suffering and evil ; the thought of such an immanent purposiveness carries us beyond man and Nature to their dependence on a timeless standard. Nor can the presence of disvalue within experience be reconciled with the metaphysical or the religious conviction of the primacy of value save by aid of the same discrimination. The lesson has been taught, once for all, by Spinoza. Deny, with Naturalism, the timeless archetype ; and good and evil, truth and error, fall on the same plane of actuality. If the values, which in temporal history are engulfed in a welter of disvalue, are to secure an indefeasible status in reality, it must be by acknowledgement of a timeless order, at once transcending and inspiring the course of cosmic evolution.

25. Can we offer, on the assumption of a timeless teleological order, a rational account of its relation to the world of spatio-temporal events ? We found this difficulty insoluble on the hypothesis of a timeless mathematical order. Unless teleology can suggest a solution, we are left with an irreducible dualism, in other words, with a factor of sheer irrationality.

It may help towards an answer if we raise another question, arising in connexion with the facts of purposiveness in Nature, that, namely, of the subject of purpose. A purpose, as Kant saw, implies a purposing intelligence. Where is the purposing intelligence, when we pass from human to infra-human purposiveness ? Even in man, conscious purposiveness is pervaded and upheld by what, for want of a better term, we describe as the general *nisus* of the universe. Bosanquet has pointed out that we cannot account for the facts in terms merely of discernible

finite subjects. Or are we to refuse the title purposiveness to the instinct of the bee and to the growth of the acorn into the oak? Phrases such as "quasi-purpose" or "unconscious purpose" simply serve to cover our affirmation and denial of purpose in the same breath. Either the term "purposiveness" is a misnomer, or it implies a mind. The problem is urgent when we find empirical philosophers speaking of a directive trend or bias in the process of emergent evolution. Professor Alexander tells us in a well-known passage that "space-time itself, by virtue of its own *nisus*, elaborates without forethought a "hierarchy of ministration" which, if it were produced by mind, would imply a vast and all-wise forethought of providence."* Is not this just what is implied? Professor Alexander is perfectly consistent with his empirical method in refusing to ascribe purpose below the level of mind's emergence, and in interpreting the apparent purposiveness in terms of the survival of the fittest. Where I find it hard to follow him is in his discrimination of this criterion from that of the survival of---whatever happens to survive. Is the process, then, one of pure accident; or are we driven, in Aristotelian fashion, to a hypostasization of Nature in the abstract? General Smuts seems to prefer the latter of these strange alternatives. His ambiguity as to the real subject of cosmic purpose is at times bewildering. Holism is a "*vera causa*," a definite guiding agency, "creative and self-creative" behind the passage of Nature; though initially it is a mere tendency which attains fulfilment in the evolutionary process.† We are haunted, here also, by the spectre of the *Als ob*; "it is as if the Great Creative spirit hath said: 'Behold I make all things new.'"‡ Purpose, again, is a metaphor, prior to mind; yet the universe "has an immanent Telos."§ Is not Holism,

* *S.T.D.* II, p. 415.

† *Holism*, pp. 86-7, 342.

‡ *ib.*, p. 106.

§ *ib.*, pp. 241, 342-3, 179.

like all "isms," an abstract concept, a symbol for the acknowledged fact that wholes of increasing complexity do actually emerge; but impotent, as all symbols must be, to furnish a *vera causa* directive of the ordered sequence of events. What is it, we ask, that develops to these fine issues? Not individual centres of consciousness merely, for the *nisus* palpably transcends these; nor a universal cosmic purposiveness, for no concrete subject of such purposiveness is discernible. How can the form of the series be one of its members, or that which is the Alpha and the Omega of the temporal process lie itself within the bounds of Time?

26. If this be true within the temporal process, it must be true also of a timeless system. Bosanquet's suggestion of an ultimate "satisfactoriness" which gives no one "satisfaction" is surely, to the eye of reason, profoundly unsatisfying. Apart from a purposing mind, such a system is an "ism," a mere abstraction, which can furnish no ground for concrete actuality.

It is at this point that a rational teleology carries us forward to the thought of God.

Dr. Whitehead, following in the wake of Plato, sees the necessity for this advance. If I understand aright his cryptic and all too terse pronouncements, the ingreience of eternal objects into Nature requires a controller of creativity, actual and eternal, who is the source of limitation, actuality and value. Whatever may be the relation of God to the substantial activity of Nature on the one hand, and to the eternal objects on the other, He is posited as the timeless subject of the world-purpose, a Being perfect in wisdom and goodness, analogous to Plato's God, who brings into actuality the spatio-temporal cosmos, in the likeness of the forms, and for the best. There is no question, on such a view as this, of a "block" universe or of denial of reality to time. Timeless cause and temporal effect alike find a place in the hierarchy of being. The eternal mind by a timeless act implants the *nisus* towards perfection in a world designed to

work out its spiritual destiny through trial and error in a process of temporal self-development. I have already hazarded the further suggestion, to which, as far as I can see, Dr. Whitehead lends no authority, that the status of the eternal objects can only be determined on the line, not of Plato himself, but of Plato's followers, that they have timeless actuality as the thoughts of the divine mind. If this gloss be accepted, the theistic postulate offers a solution—in my opinion, the only tenable solution—both to the problem of the possibility of an archetypal purpose (the teleological system) and to that of the relationship of this timeless archetype to the spatio-temporal world.

27. With this conception, unproven and unprovable, yet commended to our acknowledgement by many convergent lines of reasoning, I bring my paper to a close. Theism, like all other attempts at metaphysical explanation, is beset with difficulties, the gravity of which I have no desire to minimize. Reason, for all its power of self-transcendence, is bounded for finite minds. We cannot, for example, hope to comprehend how life is lived by an infinite and timeless being, or how such being allows of self-expansion, in the production of a world other than itself, without derogation of its unchangeable perfection.* We conjecture but dimly, from pale reflections in the mirror of human experience, that creative love gives forth of its plenitude, yet

* That this is a live alternative in metaphysics is evidenced by the whole history of Neo-Platonism. The clearest formulation is to be found in Proclus, *Inst. Theol.*, 27. "Every true productive cause rests unaltered while its consequent proceeds from it. Subsisting in fullness and perfection, it brings to actuality the order of Being subordinated to it; and this without movement, without loss, but keeping its own essence, neither transmitted into its consequents nor suffering any diminution" (tr. E. R. Dodds, *Select Passages illustrating Neo-Platonism*, p. 26). Christianity added creative love as the motive principle in this unilateral causality. Spinoza drew on both sources; thus harmonizing the initial definition of substance as perfectly self-contained, yet causal (*essentia = potentia*), with the concept of *amor intellectualis Dei*, wherein man's love for God is identified with God's love for man (*Eth.* V, 36).

suffers no circumscription or contraction. The faith that makes bold to affirm such things as these travels indeed beyond the limits of the argument from teleology. But it springs out of the endeavour to furnish a reasonable account of the implications of that argument. In doing so, it finds support at once in the *via analogica* and in the claim of reason to know the real. Reason conceives the real as a unified system that is, at least, teleological. The course of the world's history manifestly fails to satisfy the requirements of such a system. But it presents features analogous to those requirements; approximating, in its ever-creative passage, to the ideal of a rational teleology. The final goal of a process, while immanent throughout, cannot be part of the process itself. We are impelled, therefore, to think of the purposiveness discernible within Nature in the light of a timeless purposiveness beyond Nature; and this in turn as the purpose of an eternal mind, which is possessed "in an eminent way" of the qualities revealed to us in the richest of our purposive experiences. Thus the appeal, from first to last, is alike to *a priori* and *a posteriori* grounds. On their union, generative of a rational faith in a purposive order of the universe, rests the significance of the argument from design.

ABSTRACT OF THE MINUTES OF THE PROCEEDINGS
OF THE ARISTOTELIAN SOCIETY FOR THE
FORTY-EIGHTH SESSION, 1926-27.

THE Meetings of the Session were held in the Conference Hall of the University of London Club, Gower Street, London, on Monday evenings, at 8 p.m. :—

November 1st, 1926.—Prof. C. Lloyd Morgan, President, in the Chair. The President delivered the Inaugural Address, "Objects Under Reference." Discussion: Prof. Nunn, Mr. Hannay, Miss Sinclair, Miss Oakeley, Mr. Cator, Dr. Thomas, Mr. Cecil Brock.

November 15th, 1926.—Dr. F. W. Thomas, Treasurer, in the Chair. Mr. J. C. McKerrrow: "Evolution and Contingency." Discussion: Dr. Thomas, Mr. Cator, Mr. Hannay, Dr. Goldsbrough, Mr. Mead, Mr. Nott.

November 29th, 1926.—Prof. C. Lloyd Morgan, President, in the Chair. Dr. Dorothy Wrinch: "Scientific Methodology, with Special Preference to Electron Theory." Discussion: Prof. Lloyd Morgan, Dr. Singer, Miss Stebbing, Dr. Thomas, Mr. Mead, Mr. White, Dr. Jesse White, Mr. Hannay.

December 13th, 1926.—Prof. C. Lloyd Morgan, President, in the Chair. Mr. J. Anderson: "The Knower and the Known." Discussion: Prof. Lloyd Morgan, Mr. Price, Dr. Thomas, Mr. Cator, Mr. Hannay, Mr. Mead, Mr. Kendall, The Rev. Cyril d'Arcy, Mr. Nott.

January 10th, 1927.—Dr. F. W. Thomas, Treasurer, in the Chair.

Mr. J. H. Harley: "The Development of Social Minds."

Discussion: Dr. Thomas, Sir Francis Younghusband, Dr. Tudor Jones, The Rev. C. d'Arcy, Mr. Hannay, Mr. Mead, Mr. Nott, Mr. Bosanquet, The Rev. Seth Smith.

January 24th, 1927.—Prof. C. Lloyd Morgan, President, in the Chair. Mr. H. H. Price: "Mill's View of the External World." Discussion: Prof. Lloyd Morgan, Prof. Nunn, Mr. Hannay, Mr. Braithwaite, The Rev. C. d'Arcy, Miss Whetnall, Mr. Mead, Mr. Cator.

February 14th, 1927.—Prof. C. Lloyd Morgan, President, in the Chair. Prof. Lloyd Morgan: "A Concept of the Organism, Emergent and Resultant." Discussion: Prof. Wolf, Prof. Nunn, Mr. Joad, Miss Oakeley, Dr. Reid, Mr. Mead.

February 21st, 1927.—The Very Rev. Dean W. R. Inge, Vice-President, in the Chair. Prof. A. Wolf: "Spinoza's Conception of the Attributes of Substance." Discussion: Dean W. R. Inge, Mr. Hannay, The Rev. C. D'Arcy, Mr. Mead, Dr. Thomas, Mr. Kendall, Mr. Cator, Dr. Jesse White.

March 7th, 1927.—Prof. F. W. Thomas, Treasurer, in the Chair. Mr. J. MacMurray: "The Function of Experiment in Knowledge." Discussion: Prof. Thomas, Mr. Hannay, Miss Stebbing, Mr. Joad, Mr. Cator, The Rev. d'Arcy, Mr. Mead, Dr. Goldsbrough.

March 21st, 1927.—Miss L. S. Stebbing in the Chair. Symposium: "Error," Mr. Gerald Cator, Mr. C. E. M. Joad, Mr. H. J. Paton. Discussion: Miss Stebbing, Mr. Hannay, Dr. Goldsbrough, The Rev. d'Arcy, Mr. Brock, Mr. Nott.

April 4th, 1927.—Prof. C. Lloyd Morgan, President, in the Chair.

Dr. Ivy Mackenzie: "Sensation and Attention." Discussion: Prof. Lloyd Morgan, Mr. Cator, Prof. Thomas, Mr. Mead, Miss Oakeley, Dr. Jesse White, Dr. Goldsbrough, Dr. Ray, Mr. Nott, Mr. Hannay.

May 9th, 1927.—Prof. C. Lloyd Morgan, President, in the Chair.

Miss H. D. Oakeley: "The World as Memory and as History." Discussion: Prof. Lloyd Morgan, Prof. Conger, Dr. Garnett, Mr. Harley, Prof. Thomas, Mr. Joad, Mr. Hannay, The Rev. d'Arcy.

May 23rd, 1927.—Prof. C. Lloyd Morgan, President, in the Chair.

The Rev. M. C. d'Arcy: "The Claims of Common Sense." Discussion: Dr. Garnett, Mr. Nott, Mr. Cator, Miss Stebbing, Mr. Joad, Mr. Hannay, Mr. Hanson, Mr. Mead, The Rev. Seth Smith.

June 13th, 1927.—Prof. Beatrice Edgell in the Chair. Prof.

Francis Aveling: "Mental Association." Discussion: Prof. Edgell, Mr. Hannay, Mr. Mead, Prof. Thomas, Miss Oakeley, Dr. Garnett, Mr. Nott.

June 20th, 1927.—Dr. W. R. Matthews in the Chair.

Prof. W. G. de Burgh: "The Significance of the Argument from Design." Discussion: Dr. Matthews, Prof. Thomas, Miss Oakeley, Mr. Joad, Mr. Hannay, The Rev. d'Arcy.

JOINT SESSION WITH THE MIND ASSOCIATION AT BEDFORD COLLEGE, LONDON.

First Session : July 15th, at 8 p.m.—Prof. T. P. Nunn in the Chair. Address by Prof. Beatrice Edgell: "The Structure of Mind." Discussion: Prof. Nunn, Prof. Stout, Prof. Moore, Prof. Carr, Prof. Smith, Mr. Dixon.

Second Session : July 16th, at 10 a.m.—Prof. C. D. Broad in the Chair. Symposium: "Facts and Propositions." Mr. F. P. Ramsey, Prof. G. E. Moore. Discussion: Prof. Broad, Prof. Stokes, Mr. Dixon, Mr. Braithwaite, Miss Whetnall, Prof. de Burgh.

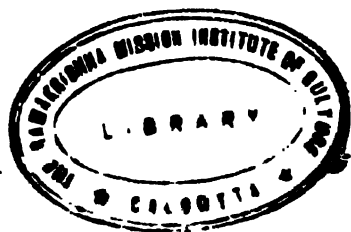
Third Session : July 16th, at 2 p.m.—Prof. G. E. Moore in the Chair. Symposium: "Is the Fallacy of Simple Location a Fallacy?" Miss L. S. Stebbing, Mr. R. B. Braithwaite. [Dr. Wrinch was unable to be present.] Discussion: Prof. Moore, Prof. Alexander, Prof. Carr, Mr. Dixon, Prof. O'Rahilly, Miss Oakeley, Miss Smith.

Fourth Session : July 16th, at 8 p.m.—Prof. Beatrice Edgell in the Chair. Symposium: "The Nature of Introspection." Prof. G. Dawes Hicks, Prof. G. F. Stout, Prof. G. C. Field. Discussion: Dr. Shand, Prof. Alexander.

Fifth Session : July 17th, at 10 a.m.—Prof. G. F. Stout in the Chair. Symposium: "The Problem of Meaning." Dr. F. C. S. Schiller, Mr. A. C. Ewing, Mr. W. F. R. Hardie. Discussion: Prof. Stout, Prof. Moore, Judge Dowdall, Mr. Dixon, Mr. Russell, Prof. Stocks, Mr. Ward, Mr. Ryle, Prof. Bowman.

Sixth Session: July 17th, at 2 p.m.—Prof. G. Dawes Hicks in the Chair. Symposium: “The Mutual Relations between Ethics and Theology.” Prof. J. Laird, Miss H. D. Oakeley, The Master of Balliol. Discussion: Prof. Dawes Hicks, Principal Galloway, Mr. Joad, Mr. Hannay, Miss Stebbing, Mr. Stokes, The Rev. d’Arcy, Prof. de Burgh.

Seventh Session: July 17th, at 8 p.m.—Lord Haldane in the Chair.—Symposium: “The Nature of Objective Mind.” Prof. H. Wildon Carr, Prof. A. A. Bowman, Prof. J. A. Smith. Discussion: Lord Haldane, Prof. Alexander, Prof. Dawes Hicks.



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1924. J. L. DIXON, The Penn Club, 9, Tavistock Square, W.C.
1924. Judge H. C. DOWDALL, M.A., Melfort Cottage, Boar's Hill, Oxford.
1924. Rev. RICHARD DOWNKY, D.D., The Mission House, Brondesbury, N.W. 2.
1918. Rev. JOHN DRAKE, M.A., B.D., Serampore College, Bengal.
1918. Prof. JAMES DREVER, M.A., B.Sc., D.Phil., The University, Edinburgh.
1911. Mrs. N. A. DUDDINGTON, M.A., 13, Carlton Terrace, Child's Hill, N.W. 2.
1880. Sir WYNDHAM DUNSTAN, M.A., LL.D. (Honorary Member), 38, Cranley Gardens, S.W. 7.
1910. Miss BEATRICE EDGELL, M.A., Ph.D., 15, Lyon Road, Harrow.
1923. IRWIN EDMAN, Ph.D., Columbia University, New York.
1917. Rev. A. E. ELDER, The Vicarage, Otford, near Sevenoaks.
1921. GILBERT ELLIOT, M.A., 10, Regent's Park Terrace, N.W. 1.
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1922. Miss E. MARGERY FOX, County School for Girls, Beckenham.
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1916. Miss H. GAVIN, 27, Belsize Park, N.W. 3.
1919. Rev. W. F. GRIKIE-COBB, D.D., 26, Drayton Court, S.W. 10.
1897. Prof. W. R. BOYCE GIBSON, M.A., D.Sc., Lichfield, Wallace Avenue, Torrak, Melbourne, Australia.
1918. Mrs. MARY H. GIBSON-SMITH, Ph.D., The Croft, 21, Woodlands Park, King's Norton, Birmingham.
1911. Prof. C. M. GILLESPIE, M.A., The University, Leeds.
1913. MORRIS GINSBERG, M.A., D.Lit., 37, Great James Street, W.C. 1.
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1912. Prof. FRANK GRANGER, D.Lit., 37, Lucknow Drive, Nottingham.
1920. THOMAS GREENWOOD M.A., Ph.D., L.ès L., c/o R. Geographical Society, S.W. 7.
1921. Prof. DANIEL GRIFFITHS, Granville House, Pontypool, Mon.
1922. Prof. J. A. GUNN, M.A., Ph.D., The University, Melbourne, Australia.
1922. Rev. Canon J. GURNHILL, B.D., The Priory, Minster Yard, Lincoln.

Electet.

1920. M. A. HAFEZ, M.A.
 1883. Right Hon. Viscount HALDANE OF CLOAN, O.M., *Vice-President*, 28, Queen Anne's Gate, S.W. 1.
 1917. J. S. HALDANE, M.A., LL.D., Cherwell, Oxford.
 1915. Miss S. ELIZABETH HALL, 6, Prince Arthur Road, N.W. 3.
 1921. H. F. HALLETT, M.A., The University, Leeds.
 1925. G. R. HAMILTON, Swan House, Chiswick Mall, W.4.
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 1919. Rev. R. HANSON, M.A., B.D., St. Botolph's Vicarage, Charterhouse Square, E.C.
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 1922. O. F. A. HARE, Backwell Down, Flax Bourton, Somerset.
 1923. Miss K. HARE, 45, Guilford Street, W.C.1.
 1923. J. H. HARLEY, M.A., 59, Parliament Hill, N.W. 3.
 1921. C. R. S. HARRIS, M.A., All Souls' College, Oxford.
 1921. G. W. HARRIS, B.A., 3, Rathbone Place, W. 1.
 1923. A. R. W. HARRISON, M.A., 3, Little Dean's Yard, Westminster.
 1918. Miss VICTORIA HAZLITT, M.A., Bedford College, N.W. 1.
 1918. Prof. A. E. HEATH, M.A., 2, Devon Terrace, Swansea.
 1922. G. F. HEMENS, B.Sc., 69, Royal Hospital Road, Chelsea, S.W. 3.
 1924. Miss A. M. HENDERSON, Sesame Club, 49, Grosvenor Street, W.1.
 1915. Prof. H. J. W. HETHERINGTON, M.A., The University, Glasgow.
 1890. Prof. G. DAWES HICKS, M.A., Ph.D., Litt.D., *Vice-President*, 9, Cranmer Road, Cambridge.
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 1918. MICHEL G. HOLBAN, British Empire Club, St. James's Square, S.W. 1.
 1926. Miss E. S. HOOPER, 18, Grove Terrace, N.W. 5.
 1916. S. E. HOOPER, M.A., The Cottage, Cookham Dene, Berks.
 1923. RANDOLPH W. HUGHES, M.A., King's College, Strand, W.C. 2.
 1916. Very Rev. Dean W. R. INGE, D.D., *Vice-President*, The Deanery, St. Paul's, E.C. 4.
 1913. ALEXANDER C. IONIDES, jun., 34, Porchester Terrace, W. 2.
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 1919. N. ISAACS, 47, Hills Road, Cambridge.
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 1923. E. F. JACOB, M.A., 54, South Eaton Place, S.W. 1.
 1921. Prof. G. B. JEFFERY, M.A., D.Sc., Balnagall, Potter Street, Pinner.
 1904. Prof. F. B. JEVONS, M.A., D.Litt., Hatfield College, Durham.

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 1918. C. B. JOHNSON, M.A., 2, King's Bench Walk, E.C. 4.
 1919. Prof. JAMES JOHNSTONE, D.Sc., The University, Liverpool.
 1924. WALTER HENRY JOHNSTONE, B.A., 9, Amherst Road, Ealing.
 1920. R. F. JOHNSTONE, The Forbidden City, Pekin.
 1911. Rev. TUDOR JONES, M.A., Ph.D., 14, Clifton Park, Bristol.
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 1925. GUY KENDALL, M.A., 25, Thurlow Road, Hampstead, N.W. 3.
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 1923. Rev. F. W. KINGSTON, M.A., Willington Vicarage, Bedfordshire.
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 1916. Prof. J. LAIRD, M.A., The University, Aberdeen.
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 1924. Miss M. J. LEVETT, M.A., 12, Victoria Crescent, Glasgow, W.
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 1908. A. D. LINDSAY, M.A., LL.D., *Vice-President*, Master of Balliol, Oxford.
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1916. C. A. MACE, M.A., 11, Netherhall Gardens, N.W. 3.
 1915. Mrs. C. A. MACE, M.A., 11, Netherhall Gardens, N.W. 3.
 1925. IVY MACKENZIE, M.A., B.Sc., M.D., 10, Woodside Terrace, Glasgow.
 1916. Prof. J. S. MACKENZIE, Litt.D., 2, Hertford Street, Cambridge.
 1910. Sir W. LESLIE MACKENZIE, M.A., M.D., 14, Belgrave Place, Edinburgh.
1923. Mrs. PREYTON MACKESON, 1, Eldon Road, W. 8.
 1924. JOHN MACMURRAY, M.A., Balliol College, Oxford.
 1918. Prof. A. MAIR, M.A., 26, Parkfield Road, Princes Park, Liverpool.
 1919. Miss JESSIE A. MALLETT, 29, Launceston Place, W. 8.
 1923. W. H. O'N. MANNING, M.A., Avilion, Ballyholme, Bangor, Co. Down.
 1916. Rev. W. R. MATTHEWS, M.A., D.D., King's College, Strand, W.C. 2.

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1918. WM. MONTGOMERY MCGOVERN, Ph.D., School of Oriental Studies, Finsbury Circus, E.C. 2.
1899. J. LEWIS MCINTYRE, D.Sc., Abbotville, Culter, N.B.
1921. J. C. MCKERROW, 34, Cartwright Gardens, W.C. 1.
1914. G. R. S. MEAD, B.A., 21, Ovington Street, Lennox Gardens, Chelsea, S.W.3.
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1920. E. MILLER, M.A., 45, Mecklenburg Square, W.C.1.
1889. R. E. MITCHESON, M.A., Les Iris, Roquebrune, Alpes Maritimes, France.
1921. WALTER H. MOBERLY, M.A., The University, Manchester.
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1923. Prof. W. P. MONTAGUE, M.A., Ph.D., Columbia University, New York.
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 1922. HANS PRESSBURGER, Ph.D.
 1924. H. H. PRICE, B.A., B.Sc., Trinity College, Oxford.
 1913. Prof. A. S. PRINGLE-PATTISON, LL.D., D.C.L., 16, Church Hill, Edinburgh.
 1916. Miss M. PUNNETT, B.A., *Librarian*, London Day Training College, Southampton Row, W.C. 1.
 1926. Prof. ALFRED O'RAHILLY, Registrar's House, University College, Cork.
 1922. M. B. RAY, M.D., 6, Bentinck Street, W. 1.
 1924. Miss E. C. RECKITT, 9, Old Square, Lincoln's Inn, W.C. 2.
 1922. LOUIS ARNAUD REID, M.A., Ph.D., The University, Liverpool.
 1918. Prof. H. MAURICE RELTON, D.D., The Vicarage, Isleworth.
 1918. C. A. RICHARDSON, M.A., Willow House, Whalley, Blackburn.
 1925. W. A. RICHARDSON, B.A., University College, Nottingham.
 1921. Mrs. RIDDEL, 15, Mount Street, W. 1.
 1920. Mrs. URSULA ROBERTS, 19, Woburn Square, W.C. 1.
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 1908. Prof. G. R. T. ROSS, D.Phil., Rangoon College, Burma.
 1921. LEON ROTH, M.A., Ph.D., The University, Manchester.
 1919. Miss E. M. ROWELL, M.A., Royal Holloway College, Englefield Green, Surrey.
 1912. SATIS CHANDRA ROY, B.A., P.O. Ramma, Dacca, Bengal.
 1896. Hon. BERTRAND RUSSELL, M.A., *Vice-President*, 31, Sydney Street, S.W. 3.
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 1921. Prof. LEONARD J. RUSSELL, M.A., B.Sc., D.Phil., 304, Hagley Road, Edgbaston, Birmingham.
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 1912. Prof. J. W. SCOTT, M.A., D.Phil., University College, Cardiff.
 1921. Miss ELIZABETH SCOTT, M.A., The University, Birmingham.
 1918. W. E. G. SEKYI, M.A., Anibok Chambers, Cape Coast, Gold Coast, West Africa.
 1925. Dr. NARENDRA NATH SENGUPTA, M.A., Ph.D., University of Calcutta.
 1892. ALEXANDER F. SHAND, M.A., 1, Edwardes Place, Kensington, W. 8.
 1917. G. BERNARD SHAW, 10, Adelphi Terrace, W.C. 2.
 1917. Mrs. G. BERNARD SHAW, 10, Adelphi Terrace, W.C. 2.
 1901. A. T. SHEARMAN, M.A., D.Lit., Bellevue Road, W. Cowes, I. of Wight.
 1911. H. S. SHELTON, B.Sc., 151, Richmond Road, Twickenham.
 1910. Miss F. ROSAMOND SHIELDS, M.A., 22, Montfort House, Bethnal Green, E. 2.

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 1917. Miss MAY SINCLAIR, 1, Blenheim Road, St. John's Wood, N.W. 8.
 1924. CHARLES SINGER, D.Sc., 5, North Grove, Highgate Village, N. 6.
 1924. Mrs. SINGER, 5, North Grove, Highgate Village, N. 6.
 1925. A. H. SMITH, M.A., New College, Oxford.
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 1908. Prof. J. A. SMITH, M.A., *Vice-President*, Magdalen College, Oxford.
 1917. Prof. NORMAN KEMP SMITH, D.Phil., LL.D., Ellerton, Grange Loan, Edinburgh.
 1886. Prof. W. R. SORLEY, M.A., LL.D., LL.D., St. Giles, Chesterton Lane, Cambridge.
 1908. K. J. SPALDING, M.A., Heather Bank, Haslemere, Surrey.
 1908. Miss H. M. SPANTON, 1, The Paragon, Blackheath, S.E. 3.
 1926. W. O. STAPLEDON, 7, Grosvenor Avenue, West Kirby.
 1910. Miss L. S. STEBBING, M.A., 27, Belsize Park, N.W. 3.
 1918. Rev. C. R. SHAW STEWART, M.A., 6, Queen's Elm Square, S.W. 3.
 1919. Prof. J. McKELLAR STEWART, B.A., D.Phil., The University, Adelaide, S. Australia.
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 1887. Prof. G. F. STOUT, M.A., LL.D., *Vice-President*, Craigard, St. Andrews, Scotland.
 1915. OLIVER STRACHEY, 41, Gordon Square, W.C. 1.
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1890. Prof. CLEMENT C. J. WEBB, M.A., Walnut Tree House, Marston, Oxford.
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1922. Miss E. HELEN WEIL, B.A., 174, Goldhurst Terrace, N.W. 5.
1896. Prof. R. M. WENLEY, D.Phil., LL.D., American University Union, 50, Russell Square, W.C. 1.
1925. Miss E. M. WHETNALL, Cranford Hall, nr. Hounslow, Middlesex.
1907. Mrs. JESSIE WHITE, D.Sc., 93, Gt. Russell Street, W.C. 1.
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1923. Miss JANE E. WILLS, B.D., County School for Girls, Gravesend.
1900. Prof. A. WOLF, M.A., D.Lit., School of Economics, Houghton Street, W.C. 2.
1919. Rev. A. WOOD, D.D., St. Ann's Lodge, Orpington, Kent.
1920. Miss CHARLOTTE WOODS, Graythorpe, Kingswood, Surrey.
1918. Miss E. M. WORTHINGTON, 31, Gledhow Gardens, S.W. 5.
1917. Dr. WRINCH, M.A., D.Sc., Beechwood, Woodcote, Oxford.
1910. Sir FRANCIS YOUNGHUSBAND, K.C.S.I., K.C.I.F., Litt.D., Currant Hill, Westerham, Kent.

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(August, 1927.)

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